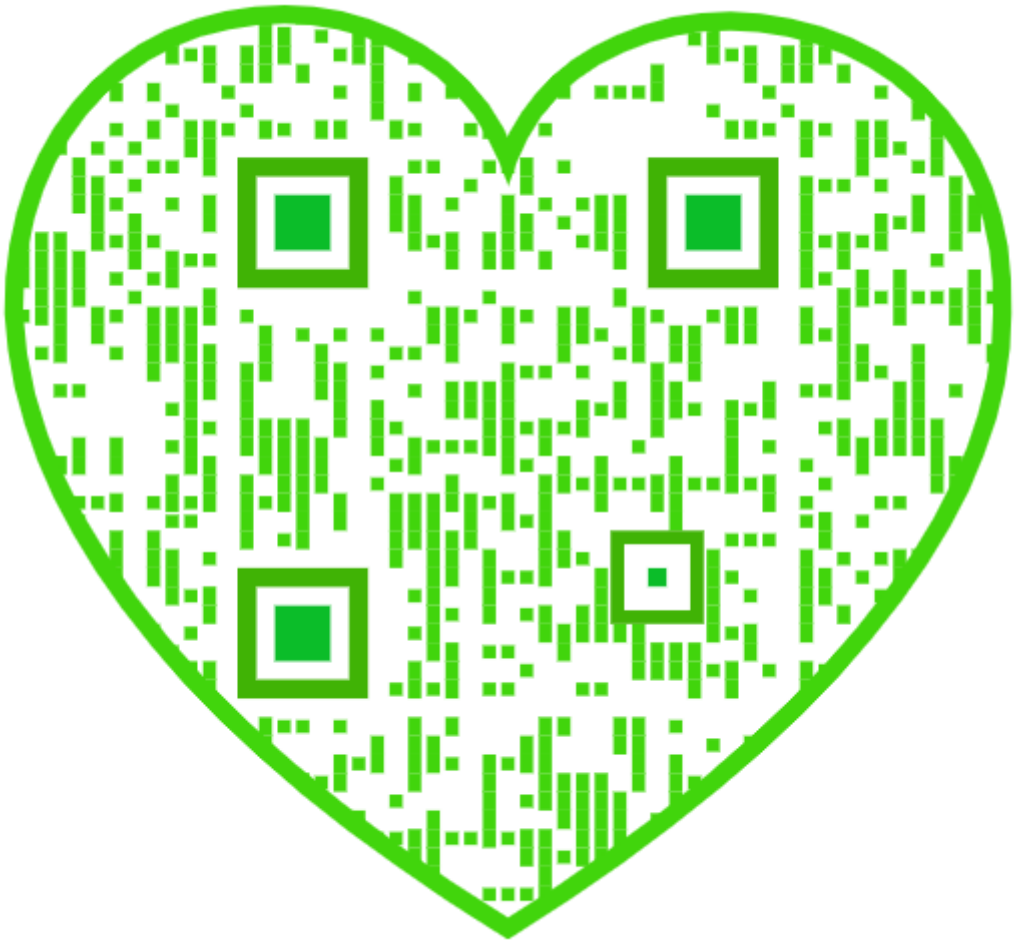
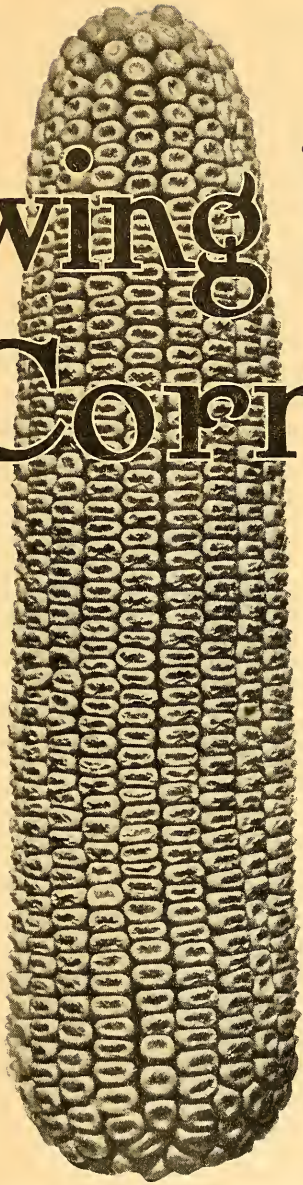


191
H75
by 1

Growing Prize Corn



PUBLISHED BY
THE FARM JOURNAL
PHILADELPHIA

PREFACE

This booklet has been prepared for the particular use of **Farm Journal** Boys.

It is to tell them, as simply and clearly as possible, how to raise the best corn, and to insure, as far as possible, that they will win the first prize in any Corn Contest they may enter. The methods here given will surely achieve this result, whether the contest is on a basis of the best ears, the heaviest yield, or the greatest profit. While not identical, the system that will secure any one of these ends will secure the others. They are the fundamentals of modern scientific corn-growing.

Of course, as between two boys using the same system and equal industry and care, the prize will go to the one who has the better soil or the better seed corn, or both. But as between two boys having equal soil, seed, and energy, the one following the directions of this booklet will surely win out.

The text and illustrations have been taken from Prof. P. G. Holden's **Corn Secrets,** first published by us in 1910, omitting some passages which, while important to corn growers, are not absolutely essential in a special hand-book of this kind. Such an instance is the very valuable chapter in **Corn Secrets** on "Corn Enemies," which we have not been able to include. For a complete and authoritative treatise on corn, from all sides, we must refer the reader to **Corn Secrets.**

The boy who reads these pages is especially urged to make a careful study of the illustrations and descriptions, and not to pass over them in a casual way. They have been prepared with great care, and each one tells an important part of the story.

THE PUBLISHERS.

Growing Prize Corn

BY

P. G. HOLDEN

"And he gave it for his opinion that whoever could make two ears of corn or two blades of grass to grow upon a spot of ground where only one grew before, would deserve better of mankind and do more essential service to his country than the whole race of politicians put together."

—Dean Swift.

PUBLISHED BY

WILMER ATKINSON COMPANY

PHILADELPHIA

1914

Copyright, 1914, Wilmer Atkinson Company

SB191
M2H75

THE FOUR ESSENTIALS

If I owned the farms of the United States, says Prof. Holden in "Corn Secrets," I would give four orders to my farmers, as follows:

1. **Harvesting.** You must harvest during the last ten days of September and the first five days of October of this year and every year thereafter, all the seed corn intended for the next spring's planting. This seed must be strung and hung up each day, as fast as harvested, according to plans which will be explained in another place.

You will be expected to harvest and store as described, at least five times the amount of seed actually required for planting, that you may have plenty from which to select the best; and also sufficient to provide for any replanting which may be made necessary from any cause.

2. **Testing.** You must make a thorough germination test of at least six kernels from every ear selected for planting, and discard all ears that are dead or that give weak germination. You will be expected to begin this important work February 20th, and continue until it is completed, which should not be later than March 20th.

Specific directions for this work are given in another place under the head of "Preparing the Seed for the Planter" and also in "Steps in Testing Corn." You will study these directions carefully at once that you may, in due time, make the proper preparations for the work. You will be expected to follow these directions in detail as nearly as possible.

3. **Grading and Hand-Picking.** That you may secure regularity in the drop of the planter and the right number of kernels per hill (which must be not less than three), you will shell fifteen or twenty ears, each ear separately, placing the larger kerneled ears in one grade and the smaller in another. You will now test the drop of the planter with each of these grades, using the different sized plates. This is necessary to secure a uniform and proper drop. When this has been done you will proceed with the shelling, shelling each ear separately and placing it in the grade to which it belongs. You will now *hand-pick the seed* by spreading it out on a table, a small quantity at a time, discarding the black, broken, moldy, rotten, frozen and barren kernels,—kernels which will take the place of good ones in the planter and leave vacant places in the field.

You will now place the seed in sacks, one-third to one-half bushel in each, and hang, as fast as sacks are filled, in a dry place where they will be safe from injury by mice.

4. **Improvement: The Best 100 Ears.** You must take great pains at time of harvesting and tying up the seed, and

©CLA376049
MAY 26 191

especially during the preparation of the seed for the planter, to select the *choicest 100 ears*, which you must shell and keep separate from the general supply of seed by providing sacks of different colors. You must plant this best seed on one side of your best and earliest planted field. It is from this seven or eight acres thus planted that you will select all the seed in September for next year's planting, as described in Order No. 1.

There is absolutely no excuse which shall exempt you from carrying out these four orders in good faith. Any person who fails, will do so at the risk of having his lease discontinued at the close of the year.

While these instructions may seem arbitrary and dictatorial, they are not so intended, and are given only after much thought and time have been devoted to the question of improving the corn crop. If the work is carried out as outlined, and it must be, it will result in greatly increasing the yield and improving the quality of the corn crop.

It cannot possibly result in any injury to the seed or cause loss in any way. You are in a position to perform this work thoroughly with the conveniences which you have at hand. You will also observe that this work can all be done by yourself and members of your family, and with practically no expenditure of money.

It can also be done at a time when no other work will thereby be delayed or neglected. In other words, there is everything to be gained and nothing to be lost. If this work is fairly well done it will increase the yield on our farms from the present average of thirty-four bushels per acre to forty-four bushels. One additional fourteen ounce ear of corn to each hill will make forty-four bushels per acre. It is not only possible to do this, but the yield can eventually be raised to fifty-four bushels per acre.

Three Things That You Must Not Do

1. You must not import seed corn from a distance with which to plant the general crop. If, however, it becomes necessary for any reason to purchase seed corn to plant, you must secure the same from some reliable person in your vicinity. You may, if you so desire, import a small quantity for the purpose of comparison.

2. You must not follow oats with corn. This rule will be put in force after the present year when you shall have had time to make the necessary readjustments.

3. You must not continue on your farm without establishing a definite system of rotation. This rotation shall include clover or clover and timothy, and corn must not be grown more than two years in succession on the same land.

In the following chapters complete instructions, with explanations and illustrations, are given for carrying out these orders.

THE FIRST ESSENTIAL

Gathering and Storing the Seed Ears for the Next Spring's Planting

GATHERING THE SEED

Fig. 1. Harvesting the Seed Corn for Next Year's Planting.—Every ear of corn intended for planting should be harvested before the severe fall freezes, and stored where it will dry out and keep dry. In Iowa and the northern half of Illinois this work should be done the last ten days of September and the first four or five days of October. Frozen seed corn costs the country millions of dollars every year.

A Convenient Method of Gathering the Seed as One Passes Between the Rows.—Use an ordinary two bushel grain sack; a wooden hoop from a nail keg is put in the top of the sack. Some heavy cord, fourteen inches long (binding twine doubled several times) is tied to one of the bottom corners of the sack; the other end of the cord is then brought over the shoulder and tied to the hoop in the top of the sack. The cord is wrapped with an old sack to prevent the string cutting the shoulder.

Fig. 1

Fig. 2. Tying up the Seed Corn. Putting in the First Ear.—A piece of binding twine is doubled and the ends tied together. Note how the string is held in the hands.

Fig. 2

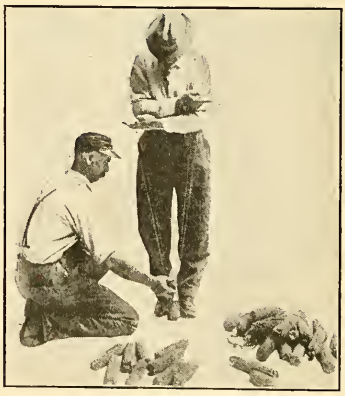


Fig. 3

Fig. 3. Putting in the Second Ear.—Notice that the left hand is run through between the two strands of binding twine held in the right hand. The hands are now brought back and the man standing is ready for the third ear, fifth ear, etc., as shown in the next figure.

Fig. 4.—The left hand is again run through the strings in the right hand, and reversed.

Fig. 5. Showing the String of Corn Completed Ready to be Hung up Where it Will Dry Out and Keep Dry.—When the last ear is laid in, one end of the string is slipped under the string in the other hand, and fastened.

Fig. 4

Fig. 5

Fig. 6

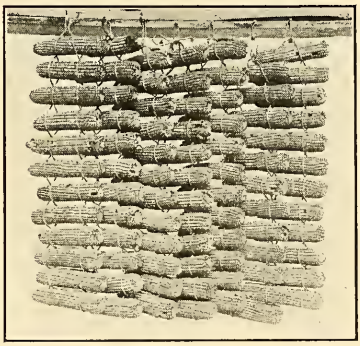


Fig. 7

Fig. 6. Commencing on the Second String.—Tie and hang up the seed the same day or evening that it is brought in. This method of tying up allows a free circulation of air. It is *circulation* of air, not heat that is needed to dry out the seed. Corn commonly contains at this time from thirty to forty-five per cent. of water. It requires but a few minutes to tie

up 300 or 400 ears. Don't leave them on the porch for the chickens to get at, or in a pile where they will mold or freeze before they are dry. TIE and HANG up at once.

Fig. 7.—Experiments show that the attic or some up-stairs room where the windows can be opened to give circulation of air during October and November, is the best place to hang seed corn. A space 3x8 feet will hold 200 strings of seed corn like the above or enough to plant 200 acres. Discard three-fourths of it in the spring and there is left sufficient to plant fifty acres, or more than the average acreage on each farm. Hang the strings in rows four inches apart each way.

A Study of the Stalk

The character of the stalk should be taken into consideration in selecting the seed.

There are almost as many things to be considered in connection with the stalk as have been discussed with regard to the ear; though it will be impossible to give to the subject the space it deserves.

There are the root system; the character of the foliage, and its distribution on the stalk; the disposition to sucker and to set several ears; the length of the shank, the time of pollenation as compared with silking; susceptibility to disease such as rust, smut and mold; tendency to break over at the roots, below the ear and above the ear; premature ripening, leaving the ear light and chaffy; the position of the ear on the stalk, high, medium or low; erect or drooping; the way the ear is covered with the husks and the comparative maturity of the different stalks and ears, etc.

The great majority of corn raisers do not take these things into consideration. They simply save the occasional good ear throughout the husking season or pick them from the crib at planting time.

We must know the stalk upon which the ear grew, whether the stalk was the only one in the hill or one of three stalks.

How is This to be Done? There is just one practical way to do it, and that is to go into the field in the fall, before the nights are cold enough to injure the vitality of the corn, and select the best ears, provided they come from strong, healthy, desirable stalks. We simply must come to this method of selecting our seed corn.

Strong Stalks. The stock from which an ear is selected should be strong, vigorous and healthy, indicating ability to win in the competition and to overcome unfavorable conditions. We should discriminate against spindling stalks, especially those that are small from the ear to the ground. Particularly should we avoid those stalks which have shown their weakness by breaking over. The ear is likely to rest on the ground and gather moisture and mold. Though the ear may not rest on the ground it will not dry out, as the wind cannot get to it. Such an ear may be sound and all right this year, but it will transmit its weakness if we use it for seed.

Height of Ear. Select ears from as nearly the same height and position on the stalk as possible. The higher growing ears will tend to make the corn later each year, and with this lateness will come larger ears, more rows and deeper kernels and finally sappiness, chaffiness, poor quality, frozen or moldy corn. Such stalks are more likely to break over in the wind.

If we go to the other extreme we will soon get an early, small, slim, flinty ear with shallow kernels and open furrows between the rows and the yield will be reduced. Or, if we select without any regard to height of ear, we will have a mixture of large and small ears, of deep and shallow kernels, of soft ears and flinty ears, which, in some respects at least, is worse than either extreme.

Drooping or Erect Ears. An ear that droops its nose slightly as the husk begins to turn yellow and open is preferable to one that stands erect allowing the water to run down under the husks and stand at the butt of the ear, which of course is undesirable. The drooping ears are generally a little earlier than the erect ones. If you have a variety in which the ears mostly stand erect in ripening time, it is better that the husks should be long enough to cover the tip of the ear and remain pretty well closed to prevent the water from running down under the cover next to the ear.

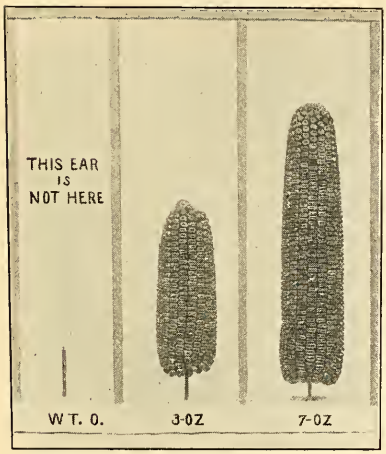


Fig. 1

Fig. 2

Short Shank Desirable. The ear should be set on a short shank close to the stalk. Ears on long shanks are more likely to be broken off and are a nuisance to handle especially if the corn is cut and shocked. Of more consequence, however, is the fact that it indicates a tendency to reversion and degeneracy.

Freedom from Disease. The stalks should be free from disease such as smut, rust, mold, etc. The corn from some ears is much more susceptible to disease than that from others. Anyone who will plant say, 50 or 100 ears, each in a separate row side by side, will notice at harvest time that some of these rows are badly affected by smut or rust and sometimes with mold, while the adjoining rows may not show a single case of disease on any of the 800 stalks. I have seen cases where nearly every stalk coming from a certain ear was affected, and so badly affected that there was not a good ear on any of the 800 stalks.

If you have never given this matter any attention you will hardly notice the rusty stalks. The leaves will show hundreds of small faded spots. These

will be better seen if you hold the leaf up to the light and look through it. You may also frequently notice a moldy appearance on the shank or at the joints often extending to the ear. These are things that are worth taking into consideration.

The Foliage, its Character and Distribution. A thin, sparse foliage is never desirable. It carries with it nothing but weakness. In the corn belt where the ear is the most valuable part of the plant, we should secure the kind of stalk and foliage which will give the greatest profit in grain. This will not be secured by a dense, heavy foliage. The best results will be between the two extremes. The leaves should not be thin, pale and papery but reasonably broad, thick, dark green and not whipped to shreds by the wind. The lower leaves should not be too much dried up and the stalk should not be prematurely ripened, as this means weak and inferior ears.

Fig. 3

Fig. 4

If the corn is grown for the fodder as well as for the ear, and is to be shocked or siloed, then the selection should be for an abundance of heavy dark-green foliage, with leaves broad, thick, leathery and green to the ground.

Sometimes a large proportion of the foliage is above the ear, in which case the wind is apt to break the stalk over. There are other disadvantages such as lateness, etc. Neither should all of the foliage be beneath the ear, but fairly well distributed, with the greater part below.

Tendency to Sucker. The tendency to much suckering is undesirable and greatly reduces the yield. There are several causes which tend to increase suckering. Rich ground with excessive plant food, wet seasons, thin stand. Suckers rob other plants of space, light, moisture and plant food and give in return little but fodder. The few nubbins which they produce are soft and reduce the quality of the crop. Even when corn is grown for fodder, suckering is not desirable. It indicates a tendency to revert to its native condition. When ears are planted in separate rows it is observed that some of the rows will have many suckers while others may be entirely or nearly free from them.

The flint corns and the dent varieties grown in the northern outskirts of the corn belt show a strong tendency to sucker. Pulling the suckers is often impracticable. The thing to do is to select seed from the stalks that are free from suckers.

Fig. 5

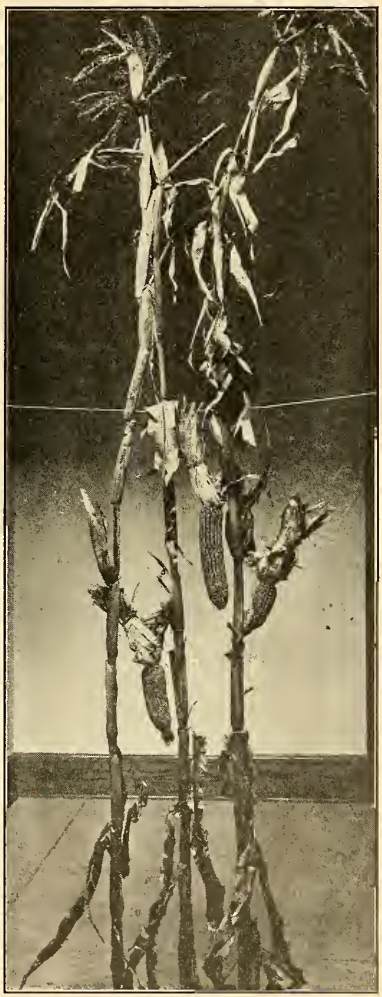


Fig. 6

Two Ears to the Stalk not Desirable. Except possibly in the case of flint varieties and the early northern dent varieties which are grown for the fodder it will be advisable to select seed from one-ear stalks. If we attempt

to secure two ears to the stalk, we will greatly reduce the quality. The ears will be small and the second one to set will be soft and imperfectly pollinated.

Covering of the Ear With Husks. A heavy mass of husks on an ear or the projection of the husks beyond the tip of the ear into a tight point are objectionable, they prevent the corn from drying and make it more difficult to husk. The husks should just fairly cover the tip of the ear and should loosen or open at time of ripening to allow circulation of air in order to dry out the corn.

Figs. 1 and 2.—The product of the average hill of corn in the corn belt equals thirty-two bushels per acre. We plant three kernels and harvest what is equal to one ten ounce ear, or one small ear weighing seven ounces and a nubbin weighing three ounces.

Fig. 7

Fig. 3. Uniformity of Height Desirable.—The height of ears will vary with different varieties, soils, and latitudes, but it should be uniform as shown by these excellent hills. If every hill produced two ears such as hill No. 1, the yield would be ninety-three bushels per acre, or nearly three times the present average of the corn belt. If each hill produced three ears such as No. 2, the yield would be 120 bushels or nearly four times the average.

Fig. 4.—We should know the stalk from which our seed ears are picked. Here are three hills of corn each with two stalks. It is apparent that the height of the two ears in each hill must be due to inheritance, since it could not be due to difference in soil or treatment, for these were necessarily the same. With different heights of ear are associated many other diversities, which are objectionable, such as difference in time of ripening, depth of kernels, shape of ear, etc.

Fig. 5. Stalks Fooling Around all Summer Doing Nothing.—Barren stalks and weak ones are the cause of great losses in every field. Where corn is grown almost wholly for the grain, these barren stalks are not simply so much loss, they are worse than worthless, for they not only deprive the good stalks of light, moisture and food, but they produce millions of grains of pollen to fertilize the silks of good ears and so propagate their kind for the future. Four of the five stalks in these two hills are barren. Notice their weak appearance. They were weak when they came up, they were weak when they first sprouted. Many of these weak stalks can be eliminated by testing each ear and discarding those with weak germination.

Fig. 6. Inheritance. Three Stalks From One Hill.—Stalk No. 3 is barren. Stalk No. 1 bore two ears which weighed one and one-half pounds equal to seventy-six bushels per acre. Stalk No. 3 is large and strong, but why barren? It inherited this tendency from some of its parents.

Fig. 7. Strong and Weak Stalks.—No. 1 is a good stalk; the ear is set just a little low. No. 2 has long joints, scant foliage and ear too near the tassel.

THE SECOND ESSENTIAL

Selecting the Type of Ear and Kernel From Which You Wish to Breed, and Testing the Ears for Vitality

EXAMINING THE EARS

Lay the ears side by side on the tables or planks arranged for that purpose, where they can be studied and compared and the poorer ones discarded.

Fig. 1

DISCARDING POOR EARS

Fig. 1.—When the table has been filled go over the ears and discard the poorer ones, i. e., those which by general appearance show immaturity, weak constitution, or are chaffy, moldy, etc. This process must be repeated by adding new ears until the table is again full of ears which, judging from outside appearance, are good.

Fig. 2.—The cover page shows a Grand Champion ear of Reid's Yellow Dent corn. It is one of the best, if not the best, all-round ear of corn ever exhibited. It was grown by D. L. Pascal, of DeWitt, Iowa. Ten and one-quarter inches long; seven and seven-eighths inches circumference two inches from butt; six and seven-eighths inches circumference two inches from tip; weight nineteen ounces.

Size of Ears. A good sized ear is essential to a good yield. It indicates that the ear comes from a strong, vigorous, healthy stalk and that in turn it will produce stalks and ears having a strong constitution and hardiness. No one would think of selecting for seed small, weak, puny-looking ears. Corn has been bred for the grain or ear until the proportion of corn to stalk is abnormally high and consequently the tendency is for the ear to become smaller unless we select larger ears than we expect in the average of the crop.

On the other hand, the greater danger lies in selecting too large ears and too large types of corn, and this is especially true of the northern half of the corn belt. For every dollar lost by growing corn that is too small or too early there are ten to twenty dollars lost from growing corn that is too large and too late in maturing. If the season is late and cold, or the frosts come too early, or if the seed is planted late in the spring, the grower has a lot of soft, chaffy, moldy, light corn. In addition to this it is very difficult to secure good seed from such corn for next year's crop. It is certain to be more or less frozen, moldy and weak, and to result in a poor stand and a poor crop. Large, sappy, immature ears fill the wagon-box rapidly, and we deceive ourselves into thinking that we are getting a large yield. Corn of this kind often contains from thirty-five to forty-five per cent. of water. When the corn dries it is loose on the cob, chaffy and light. The little cells in the kernels are only partially filled with food and are dull and chalky, or starchy, instead of bright, hard, heavy and rich in appearance. The corn is apt to spoil, especially in the bottom of the crib, i. e., burns out, and it is unpalatable to stock. The grower of such corn is required to sell at a greatly reduced price. What we want is corn that will be safe every year. Remember that two small ears, weighing but ten ounces each, to each hill will make sixty-four bushels per acre, or double the average yield. Three of them will give nearly 100 bushels per acre.

Solidity or Heaviness. This indicates full maturity, good quality, feeding value and yield.

Uniformity in Size and Shape of Both Ears and Kernels. Many exhibitors and corn growers fail fully to realize the importance of selecting ears of uniform size and shape. Large ears will generally have larger and deeper kernels. Short, bunchy ears are certain to have deeper kernels than long, slim ears. As a consequence the planter cannot be adjusted to give a uniform drop.

If we have large and small ears, bunchy and slim ears, deep kerneled and shallow kerneled ears we shall not only have unevenness in size and shape of kernels, but we shall also have a great variation in time of maturity, some stalks bearing early and some late, and some having high ears and some low.

Kernels of the same ear will not mature at the same time, and some will turn black and moldy. These late, sappy kernels are likely to be injured by freezing.

CHOOSING GOOD KERNELS

From each of these selected ears remove two or three kernels, and place them, germ side up, at the end of the ear from which they were taken. Make a more careful study of both the kernels and the ears, pulling back to be discarded those ears which have faulty kernels, i. e., ears whose kernels are too small, too shallow or are immature, starchy, or moldy, or that have small, weak, or frozen germs, etc. Do not neglect this step.

Fig. 3.—(g) is germ or heart of the kernel; (*fp*) is the white, floury, starchy looking material in the center of the kernel; (*hp*) is the hard, horny portion.

The composition of these parts is approximately as follows:

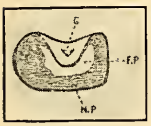


Fig. 3

	Per cent. Oil.	Per cent. Protein.	Per cent. Ash.	Total.
Germ or heart..	50.	20.	10.	80.
Horny portion..	.5	10.	.5	11.
White, floury...	.3	8.	.5	8.8

This shows that the heart of the kernel is by far the richest part. Eighty per cent. of it being composed of oil, protein and ash, the most valuable food constituents. The white, floury looking portion is the poorest part of the kernel, containing but 8.8 per cent. of the oil, protein and ash. It will readily be seen that the larger the germ or heart and the smaller the floury looking portion, the richer will be the corn. We do not need a chemist to show us the richest ears; we can determine it by examining the kernels.

The Germ, Chit or Heart of the Kernel. The germs should be large, clean, clear and bright. The germ is much richer in oil, ash and protein than the rest of the kernel, therefore, it should be large, giving us stronger germination and more vigorous plants in the field.

Be suspicious of a shriveled, wrinkled or blistered germ. In examining corn the germ should be opened up with the knife. This will enable one to determine, not only the size of the germ, but its condition. If it is pasty or salvy, or is yellow or black, the vitality is very questionable. When possible, the germination or vitality should be determined by actually sprouting six kernels taken from different parts of each ear.

Depth of Kernels. Other things being equal the deeper the kernels the greater will be the per cent. of corn to the cob and the greater the yield. It is therefore desirable to have a good depth of kernel on an ear, but since it is so, there is danger of overdoing it. There is much greater loss from selecting ears with too much depth of kernels than ears with kernels too shallow.

The objections to too deep kernels are: 1. Their immaturity, sappiness, chaffiness, mold, etc., resulting in poor quality and low, actual yield from the feeding standpoint. 2. They contain more moisture than shallow kernels, are slow in drying out and consequently the seed is more likely to freeze or mold and to give a poor stand the following year, which means a less yield. 3. The planter is made to handle the average length of kernels and will not give an even drop if they are abnormally deep. Experience shows that on an average we are much more likely to have a thin stand from deep kernels than from medium depth kernels, due first, to weakness of seed; and, second, to difficulty in securing an even drop.

Sappiness, Chaffiness, Starchiness, etc. These are all indications of immaturity and lead us to be suspicious, also, of the vitality.

A sappy ear is one which contains a large amount of water. It is shown by heaviness of ear, softness of grain and cob, and the ease with which the ear may be twisted in the hands. When the sappy ear dries out, the kernels are shriveled or shrunken and become loose on the cob. We call such an ear chaffy. When the kernels in such an ear, instead of being clear, bright, hard and horny are dull, soft and whitish or chalky in appearance, we call the ear

starchy. In all of these cases it is apparent that the corn did not have time fully to develop. Either it was too large and too late for the region, or it was planted out of season or harvested too early in the fall. For the first reason it should be discriminated against much more strongly than for the second, especially from the standpoint of seed selection.

When we say an ear is "mature," "well ripened," etc., we mean that the thousands of little cells in the kernels are completely filled, i. e., packed full of food for the future plant when the seed germinates. Immaturity means that the process by which the cells were filled was stopped too soon.

Every feeder of experience fights shy of immature corn, because animals will not consume enough to make satisfactory gains. When it molds in the field or crib, as it does more or less, it is unpalatable and unhealthy.

Corn put into the crib in the fall in a sappy condition freezes and thaws repeatedly through the winter. In March and April when the weather warms up, it will be found that the hearts of the kernels have turned to a cheesy color and later become black and are strong to the taste. In this last case I have reference not to soft, immature corn, but to what would be considered as very good corn except that it is large and contains considerable water.

The real significance of the matter will be better understood when it is realized that the germ or heart of the kernel is by far the richest part of the corn for feed.

Shape of Ear. In general the ear should conform to the variety type. For example, we would expect the Reid's Yellow Dent and Legal Tender varieties to be longer in proportion to their circumference than the Silver King or Boone Co. White. We would expect the Leaming to taper more toward the tip of the ear than the Boone Co. White or Silver Mine. We often overlook the fact that when we attempt to change the shape of the ears there are certain other things which are bound to follow. For example, if we select ears that are cylindrical, i. e., ears that are as large at the tips as at the butt, the ears within a few years will become shorter, larger around, later in maturity, higher on the stalk; the kernels larger, deeper and rougher; the stalks larger and the leaves thicker and broader.

Many breeders and exhibitors have injured their corn by selecting ears nearly as large at the tip as at the butt. On the other hand, if the ears taper too much the corn becomes flinty, the kernels shallow and small toward the tip of the ear. If we select long ears our corn will gradually become earlier, the kernels broader, shallower and harder, with furrows between the rows. The stalks will become smaller, the leaves narrower and the ears lower on the stalk. We should bear in mind that when we undertake to bring about by selection some one particular thing desired that we also secure a number of other things some of which may be very detrimental.

Climate, soil and the use to which the crop is put are also important factors to be considered in determining the type of ear to be selected. As we go north with a variety we should select ears that are more slender, and that have smoother, shallower kernels and wider furrows.

As we go south we should select larger ears, fuller in the middle, with deeper kernels and a rough dent.

In like manner a rich soil and higher altitude require, for best results, a larger ear than thin, poor soils and lower altitude. In the South a hard, flinty corn resists the weevil better than the larger, soft kerneled types.

Where corn is grown largely for the total feed value of the grain and stalks, i. e., where it is cut and shocked or put in the silo, much less attention need be given to large shanks and big butts. The fact is, these things tend to carry with them sturdiness, vigor and heavy foliage.

It is well for us to remember that when we get a small butt, shank and cob in an ear, we are bound to suffer, in other directions, more or less, for what we have gained, especially if we go to the extreme. The stalk will correlate itself with these characteristics and become slender, weaker and more likely

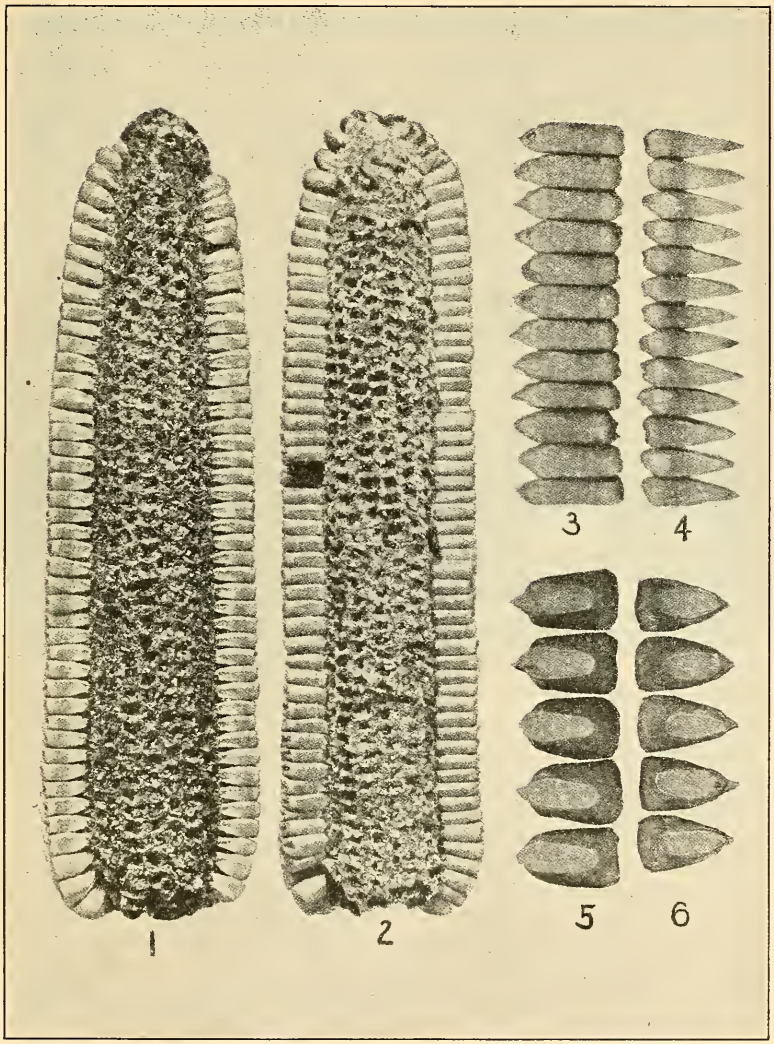


Fig. 4

to break over with the wind; the foliage will be scarcer and paler and there will be a general weakening in constitution.

Fig. 4. Space Between Kernels.—Space between kernels next to the cob is objectionable because it results in less proportion of corn to the cob, poorer

feed value and weaker stalks and lower yield. It is also an indication of immaturity. These two ears are almost exactly the same size and shape, yet No. 2 shelled out thirty-three per cent. more corn than No. 1, and the corn was cleaner, brighter and more solid. The right-hand row of kernels is from ear No. 1 with space at cob. The left row of kernels is from ear No. 2 which shows no space. Compare No. 4 with No. 3 and No. 6 with No. 5 and notice the difference in plumpness of tips of kernels. Judging from outward appearances alone these two ears presented an equally good appearance. It is not enough to study the ear only; we must study the kernels, also.

Plumpness of Tips of Kernels. It is always advisable that the kernels of an ear should have plump, bright, clean tips, which indicate good constitution, maturity and feeding value as well as a high percentage of corn to the cob.

Fig. 5

Fig. 5. Pairs of Kernels From Different Ears. Kernels Should be Uniform in Size and Shape.—It will also be observed that these kernels are far from uniform in size and shape (compare Nos. 4, 5 and 6) and hence no planter will drop an even number per hill. When we realize that all of these kernels were taken from ears that appeared to be good, when examined from the standpoint of the ear alone, we can readily appreciate the importance of paying more attention to the study of the kernels of corn in our seed ears. The shapes best for the corn belt will vary with different varieties and with the purpose for which the corn is grown, but there is a tendency toward a uniformity of shape and type of kernels for the general field crop. Such type and shape are shown best by pairs of kernels Nos. 1, 6, 7 and 12 in order named. For late planting or early feed, types like Nos. 11 and 3 are better. No. 12 has full plump tips, early clean germs and bright horny kernels. Nos. 4, 8 and 10 show the poorest shapes of kernels. It is more difficult to mature an ear with this shape of kernel than one of the same size having kernels like No. 12.

Uniformity in Size and Shape of Kernels. In selecting ears for seed or for show, much attention should be paid to picking those with kernels of uniform size and shape.

1. The kernels should be uniform on the different parts of the ear, i. e., they should not be broad and thin on one side and of the shoe-peg type on the other. They should not be thick, coarse and deep at one end, and small and round and shallow toward the other. Ears with irregular kernels commonly called "nigger heads," caused by the dropping of rows, by imperfect pollenizing or by crooked rows, should be laid aside for other ears providing these are as good in other respects.

2. In length, breadth and depth of the kernels the different ears should be as nearly alike as possible. This is necessary if we are to secure an even stand and uniformity in essential characteristics.

The particular size and shape of kernels will necessarily depend on the variety of corn grown, the length of season and the use to which the crop is put.

Well Filled Butts and Tips of Ears. Other things being equal, a well filled butt and tip are desirable. They give us just that much more corn and indicate that the corn has been well bred for a number of years. We must not, however, make the mistake as some do, of sacrificing yields and other qualities to this one thing. It is valuable just to the extent that it gives us more corn.

The well-filled tips and butts are apt to occur on rather short ears; therefore, unless we are on guard, we will unconsciously shorten the ears, and in this way lose more than we gain by adding a few more kernels to the tip and butt.

The question should always be, Is this ear as good in all other respects? If so, choose it in preference.

Furrows Between the Rows. These will vary with the latitude and with the variety. In the northern part of the corn belt it is necessary to grow varieties with fewer rows, and shallower and broader kernels. These are always accompanied with a pronounced opening or furrow between the rows.

Character of Dent. The character of the dent has much to do with the appearance of corn. It is one of the important characteristics in distinguishing varieties. While there are all gradations of dent, yet the common designations are smooth, medium rough, rough and chaffy. The tendency is for corn to become smoother on thin soils, in the shorter seasons of the north, and as the elevation is increased. Generally speaking roughness is associated with lateness, and smoothness with earliness; again, roughness is always associated with deep kernels, and smoothness with shallow kernels. There has been a tendency toward a deeper kernel, and as a consequence some of our varieties have become later, more immature, lighter and of poorer quality.

Purity of Color in Both Grain and Cob. The color of the kernels and of the cob should correspond to the variety represented.

Smoothness of Backs of Kernels. The blistering of the back of a kernel indicates that it did not dry out properly or was frozen while still sappy. In either case there is danger that the germ is weakened or killed.

Smoothness of Germ. The puffing or wrinkling of the face of the germ may indicate freezing or improper drying and should lead to a careful examination of the germ and especially of the embryo.

Adherence of Chaff to Tip Cap of Kernel. Frequently some of the chaff of the cob will adhere to the tip cap of the kernel. This is generally an indication that the ear was more or less immature when harvested. It occurs oftenest on rough, deep kerneled ears. It suggests that the ear was a little too late for the region. When shelled such corn appears dull and chaffy,

instead of clean, bright and sound, and of course there is more danger that it has been injured by mold or freezing.

Adherence of Tip Cap of Kernel to the Cob. This is similar to the condition just described above, except that the tip cap of the kernel breaks off in the cob. When the corn matures naturally the kernels will separate from the cob at the proper place, leaving the chaff attached to the cob and the tip cap to the kernel, as it should be.

The Cob, Its Size and Condition. The cob should be light, bright in color, soft, not harsh or woody, and free from mold. A large swollen butt and a projecting shank where the ear was broken off at the time of husking are objectionable.

Both of these conditions indicate lack of breeding, shallow and irregular kernels and a low proportion of corn to the cob. Ears with large butts and large shank attachments are hard to husk and slow in drying out. The shank should break off close in at the butt of the ear instead of leaving an inch or two protruding from the butt.

Straight Rows. Straight rows are preferable to crooked rows. Ears with twisting rows are certain to have more or less irregular kernels and to show inferiority in many other ways.

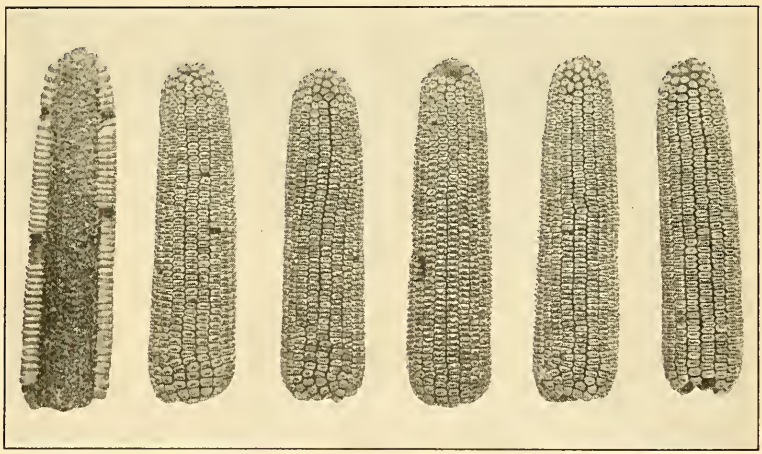


Fig. 6

Fig. 6. Grand Champion Dam and Five of its Progeny. Exhibited by Earl Zeller, Cooper, Iowa, in Iowa Junior Contest, 1910.—From the corn, shelled off the mother ear at the left and planted, Earl Zeller was able in the fall to select these five sample ears. It is seldom that so many good seed ears can be obtained from the planting of a dozen ears. We have not yet learned the value of good ears of corn, ones which will produce results in yield and quality.

Fig. 7. Space Between Rows.—Study these ears carefully. Ear No. 3 has about the right amount of space between the rows to insure best results, while ears Nos. 1 and 4 illustrate the extreme. Ear No. 1 has too much space,

showing a deterioration or "run out" appearance, and it will shell out a low per cent. of corn to the cob. On the other hand, where there is too little space between the rows, as in the case of No. 4, the ear generally presents a dull, starchy or immature appearance. The kernels are too pointed or wedge like, leaving a great deal of open space next to the cob, and are lacking in vitality. Ear No. 2 has a little too much space, while there is perhaps not quite enough on ear No. 5.

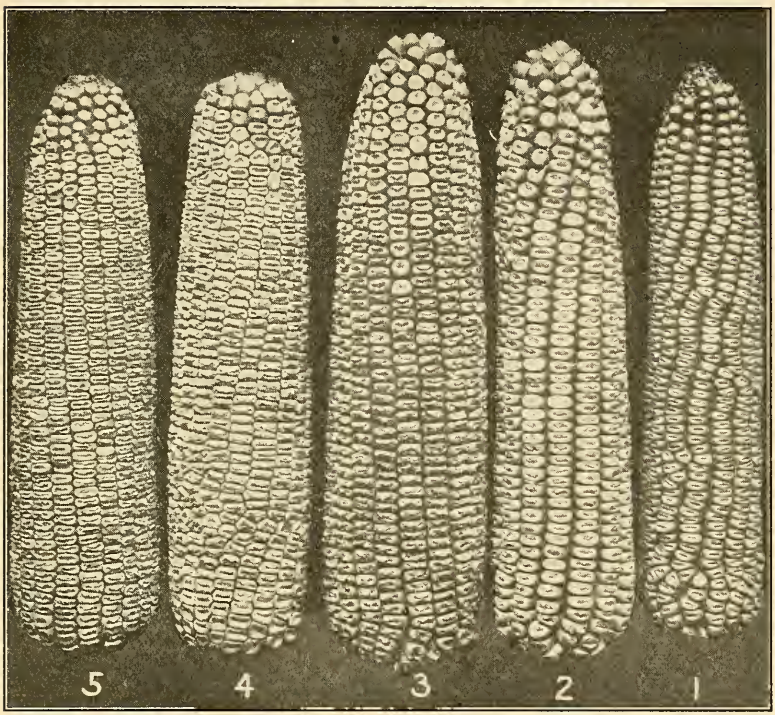


Fig. 7

Fig. 8. Irregular Kernels.—In selecting seed ears Nos. 2 and 3 should be discarded as no planter will drop a uniform number of these kernels per hill.

Ears Nos. 1 and 4 have kernels of uniform size and shape, and when the butts and tips were shelled off the planter dropped three kernels to a hill in ninety-three to ninety-five times out of every 100 tests, while ear No. 2 tested 74-3s, 19-2s, 6-1s and 1-5s.

Fig. 9. Cross Section of Ears.—Nos. 1 and 3 have about the right proportion of corn to the cob. In the case of No. 2 the cob is too small and in time the constitution and yield will suffer. The cob in No. 4 is too large.

Fig. 10. Study the Seed Ears.—Don't guess, when a little examination will reveal the strength and weakness of the ears.

Ear No. 1 is strong, sound, has good kernels with fair depth, which it carries well down to the butt of the ear.

Ear No. 2 tapers too much. The kernels are too deep at the butt, and too shallow toward the tip, making them too uneven for the planter.

Ear No. 3 has small, shallow, flinty kernels, but little larger than the kernels of pop-corn, which will run through the planter too fast.

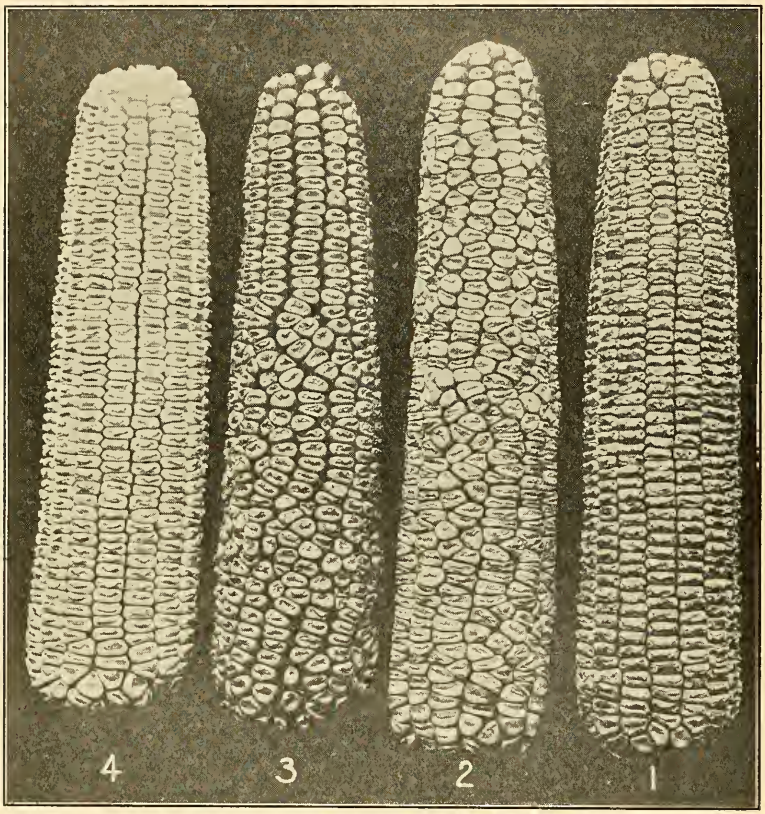
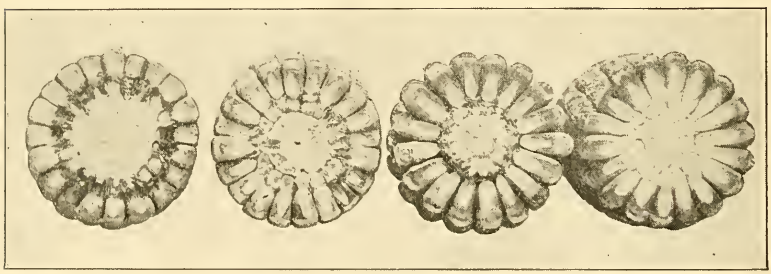


Fig. 8



4 3 Fig. 9 2 1

These three ears were shelled together and tested in the planter. The number of kernels dropped per hill ranged from two to seven.

Fig. 11. Desirable and Undesirable Ears.—Note carefully the difference in these ears. Ears Nos. 2 and 5 have kernels of fair depth, which they carry as well as they should down to the tip of the ears. Ear No. 4 has a deep kernel but becomes too shallow at the tip of the ear, and there is some space between the kernels next to the cob and the kernels are too thin for good constitution. Ears Nos. 1 and 3 have shallow, low kernels and should be discarded. Until the kernels were well examined the real weakness of these ears was not discovered. The

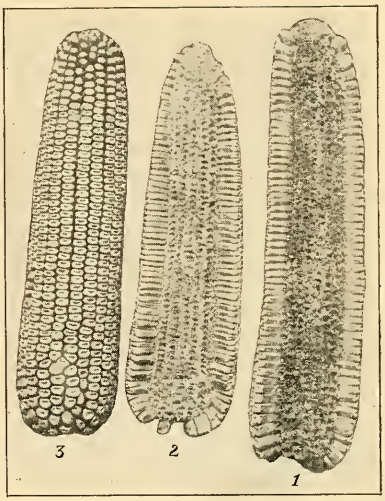


Fig. 10

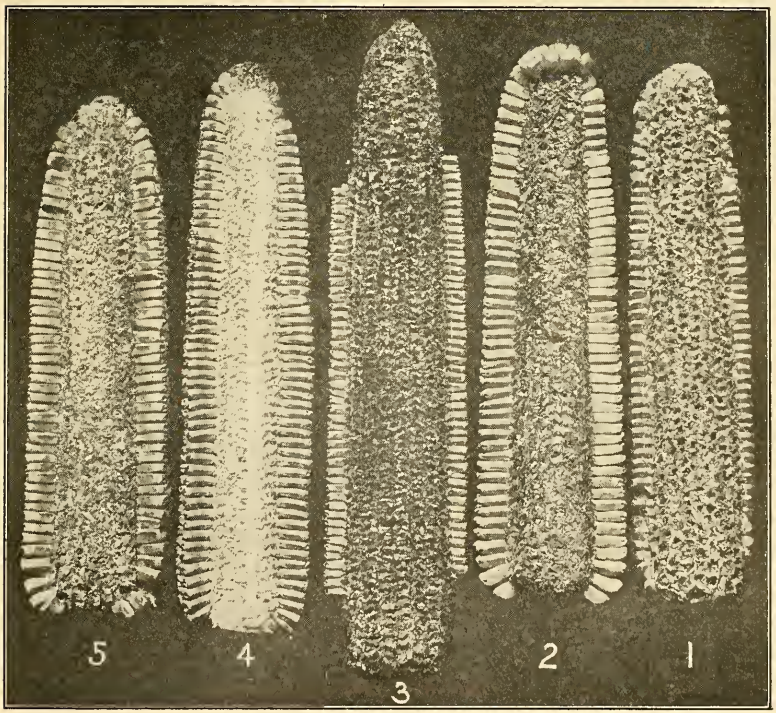


Fig. 11

casual observer would have pronounced all of these ears good from general appearance.

Fig. 12. Scrubs or Degenerates.—They are always most numerous when conditions are unfavorable, such as poor ground, late planting, poor cultivation, careless selection of seed, etc. If you will notice carefully you will observe the peculiarly beaked appearance at the front part of the crown of the kernels on ears Nos. 4 and 5. These points, where the silks attached, are almost needle-like in their sharpness. This is a sign of degeneracy wherever found. It generally appears on ears which show many other signs of degeneracy.

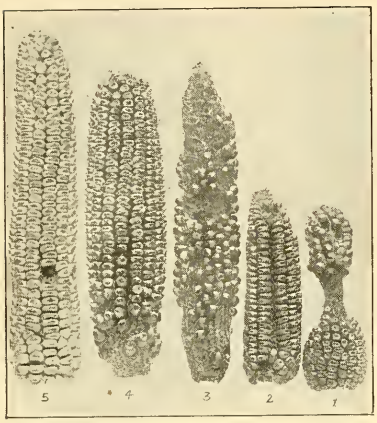


Fig. 12

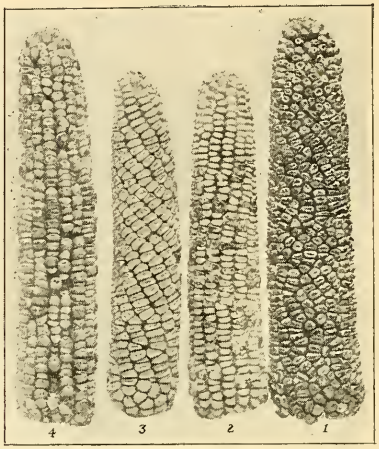


Fig. 13

Fig. 13. More Degenerates.—What a contrast to the prize winning ears! No one would think of planting these ears, but they illustrate what happens, more or less, in every corn-field but especially where we have a mixture of different kinds of types of corn.

Ear No. 1 is faulty, particularly because of the irregular rows and consequent irregular kernels.

Ear No. 2 shows the result of mixture of early and late types. If you will notice carefully you will see many broken or ruptured kernels. These kernels inherited the late characteristics of one of the parents and were soft when other kernels hardened and crowded them. The crowns broke open, and many of them have become affected and are rotten and moldy.

Ear No. 4 was too late. By the time its silks were pushed out the pollen was gone, and the only fertilization it received was from the old and weak grains of pollen which blew off the leaves and tassels where it had lodged.

Fig. 14.—Ear No. 2 has 540 kernels while No. 3 has 1140, or double the number on ear No. 2.

These ears were picked from the seed ears which were being shelled together for planting. When the man was shown these three ears, and asked if he thought the planter would give an even drop with such wide variation in kernels, he said, "Well, I hadn't thought of that; they looked like good ears and I put them in." And so they were good ears in themselves.

When these ears were shelled separately and tested in the planter, No. 2 dropped 158 kernels in 100 drops, while ear No. 3 dropped 387 kernels in 100 drops or checks. But this is not the only disadvantage; the yield and quality of the crop will be affected in other ways. There will be immature, moldy, and frozen corn, high ears and low ears, ears hard to husk and ears easy to husk, etc.

If this man had laid out his ears intended for seed side by side on the table and removed two kernels from each ear, the variation would have been apparent. The trouble was that he looked at each ear separately and without any relation to the other.

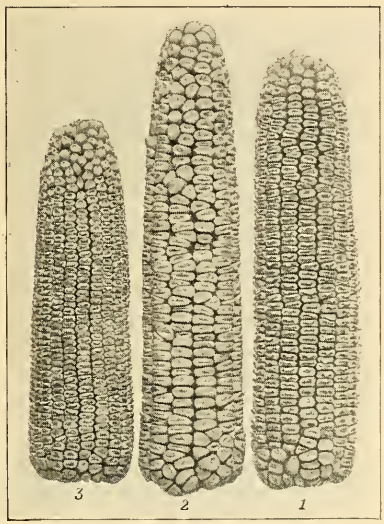


Fig. 14

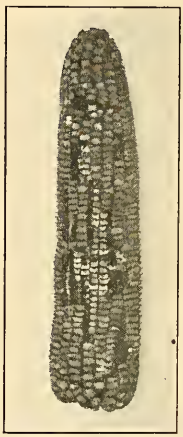


Fig. 15

Fig. 15. Broken Kernels.—Notice that many of the tips of the kernels (lower one-third) remained attached to the cob. Generally only a portion of the kernels on an ear are affected. A careful examination will show that the rows of kernels in the spots affected are slightly raised above the others. Ordinarily, this condition will not be detected until kernels are removed for study, or the ear is shelled. It is probably caused by a disease in connection with the silks, which sometimes lie between the rows of kernels as they develop. If ears are shelled separately such ears can be discarded. It is not enough to simply discard the kernels affected.

Fig. 16. The Backs of the Kernels (side opposite germ).—Examine the backs of the kernels, for weakness and strength are often revealed there. Nos. 7, 6, 14 and 13 are the strongest kernels here. They are clean, bright and horny. The only objection to Nos. 14 and 13 is that the tips of the kernels have a little too long projection. Nos. 5, 6 and 4 are even more objectionable in this respect. It interferes with the drop. The kernel is really larger than it appears. Nos. 11 and 12 are too pointed and shriveled at the tips. They indicate lack of constitution. Nos. 12 and 10 show a whitish or chalky color,

which shows that the ears did not mature. Such corn is poor in quality and will reproduce after its kind. Nos. 8 and 9, kernels cracked or broken one-third of the way to crown.

Fig. 16

Fig. 17. How to Pick Out the Ear with Rich Kernels.—The *best 100 ears*, discussed in the chapter on "The Third Essential" (see fig. 6, p. 40 "hanging up the seed") should have large, deep germs.

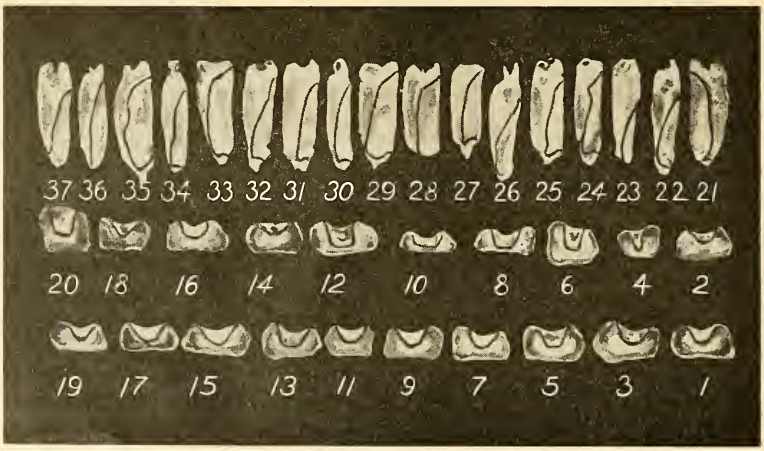


Fig. 17

In preparing the seed corn for the planter in the spring, two or three kernels are taken from each ear and laid on the table, germ side up, in front of their respective ears. You will notice that some of these kernels will have

broad germs, others will have narrow germs. In some cases the germ will run well to the crown of the kernel, etc. We should not stop by simply examining the length and breadth of the germ on the face of the kernel, we should split the kernel open with a knife lengthwise through the germ, to determine the thickness or depth as well.

Nos. 21 to 37 show the kernels split open, half of the kernels being removed. Note the great variation in depth of germ. Nos. 35, 33, 29, 28, 27 and 21 are deep germs, No. 35 being from the ear richest in oil and protein of the 1400 ears analyzed. Nos. 22, 23, 26, 31 and 32 were especially poor.

Fig. 18

The two lower rows show the cross section of the kernels, i. e., the tip of the kernels being cut off showing the depth and width of germ. Nos. 2, 4 and 14 have either narrow or shallow germs. Nos. 12, 16, 13, 15 and 17 show good size of germ.

Fig. 19

Figs. 18 and 19.—Cross section of kernel showing depth and width of germ.

Fig. 20

Fig. 20.—In No. 1 the kernels show chaffy portion of cob adhering to them. It gives a bad appearance to the corn and indicates immaturity. No. 2 shows kernels that are cracked about one-third of the way from tip to crown being injured by some disease. This condition may not be observed until the ear is shelled. Although only a portion of the kernels on an ear is affected, the whole ear should be discarded to prevent the continuation of the weakness. If each ear is shelled separately, as it should be, this can be done easily. In

No. 3 the tip cap has too long a projection which interferes with planting. These kernels also show a whitish or starchy appearance toward the tip, indicating that the ear did not fully ripen. No. 4 shows kernels with tip cap projecting, the germ having broken off in shelling. While this is not a serious defect, it shows that the ear did not ripen completely.

Of the five pairs of kernels in the lower row, No. 5 is the most desirable. Pairs of kernels Nos. 8, 9, 12 and 13 are also desirable, showing a combination of good depth, large clean germs and good maturity. Nos. 10, 11, 6 and 7 are less desirable.

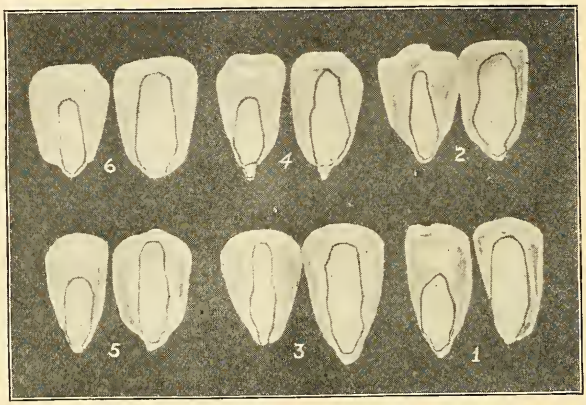


Fig. 21

Fig. 21.—Kernels showing large and small germs, taken from different ears of corn. The left-hand kernels in all pairs came from ears with low feeding value and should be discarded for seed purposes; while the right-hand kernels

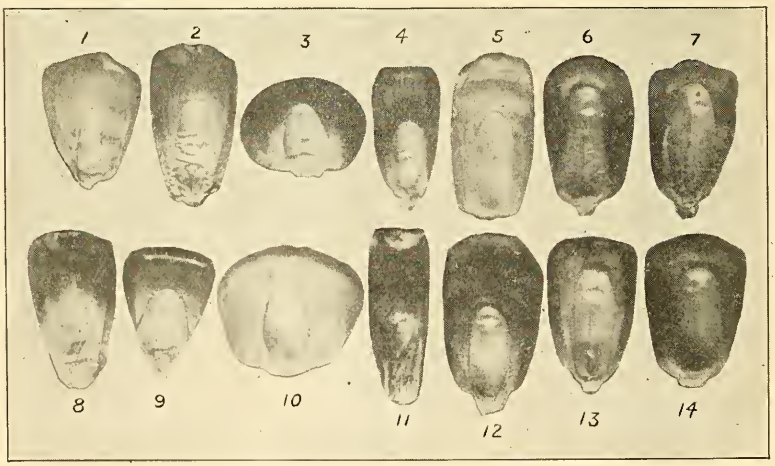


Fig. 22

with large germs came from ears with a high per cent. of oil, protein and ash and give strong plants.

Fig. 22. Type of Kernels.—Nos. 1, 2, 3, 4, 8, 9 and 11 are illustrations of kernels with small, weak germs. Note how small the germs are compared with Nos. 6, 7, 13 and 14. Nos. 8 and 9 have poor shaped kernels; this coupled with their small germs, make them very undesirable. Pointed kernels such as these do not give room for good development of the germ. In addition to being pointed, these kernels are very thin at the tips, and so are weaker than they appear. Kernels of this shape frequently break off in shelling, especially if immature. No. 2 has a shrunken, blistered germ owing to its immaturity, but it is of better form than Nos. 1, 8 or 9. Ears with pointed kernels give a very low percentage of corn to cob, as the wedge-like shape of the kernels does not allow them to fit closely at the tips next to the cob. Nos. 3 and 10 are types of very broad, shallow kernels such as are grown in the north where the season is short and where deep kernels could not mature. Kernels Nos. 5 and 12 have germs rather under the medium size, but are particularly weak at the crown. They do not carry their width up well like Nos. 13 and 14. They are thin at the crown, giving the ear a chaffy appearance. Of the remaining four No. 14 is the best, followed by Nos. 6, 13 and 7 in the order named. These four are particularly good kernels for the corn belt, they carry their width well down to the tip, have large, plump tips and large, clean germs. The general appearance of the kernels indicates strength and vitality.

THE GERMINATION TEST

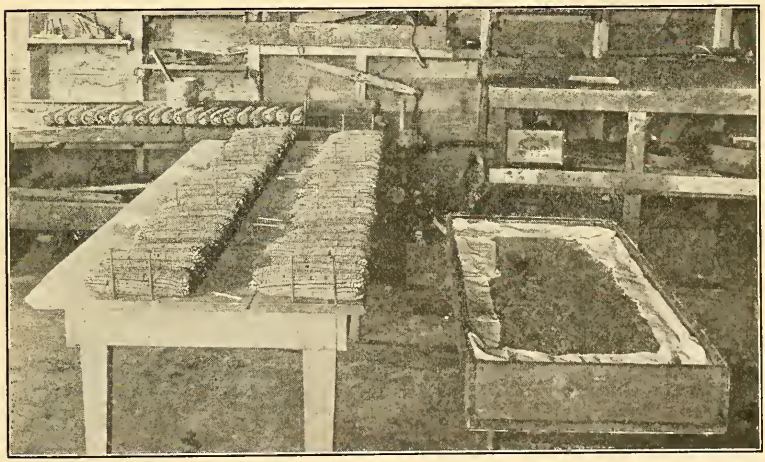


Fig. 23

Fig. 23.—After the poorer ears have been discarded, the ears are arranged as shown above; the nails separating them into ten-ear divisions. Each tenth ear is numbered 1, 11, 21, etc. Six kernels are taken from each ear, beginning with No. 1, and placed in the germination box, shown at the right of the table, to sprout.

There are several excellent Seed Corn Testers on the market. Probably no method is better suited to all conditions than what is known as the Sawdust Germination Box method, which is briefly described as follows:

Getting Ready. Make a box three to four inches deep and 30x30 inches in dimensions. Fill the box about half full of moist sawdust well pressed down so as to leave a smooth, even surface. The sawdust should be put in a gunny sack and set in a tub of warm water for at least an hour (or still better over night) so that it will be thoroughly moistened before using. Rule off a piece of good white cloth (sheeting) about the size of the box, into squares, checkerboard fashion, two and one-half inches each way. Number the squares, 1, 2, 3, etc. Place the cloth on the sawdust and tack it to the box at the corners and edges. Lay out the ears to be tested side by side, as shown in fig. 30, on planks, tables, or on the floor; remove one kernel from near the butt, middle, and tip of the ear; turn the ear over and remove three kernels from the opposite side in like manner, making six kernels in all, thus securing a sample from the entire ear. Place the six kernels at the end of the ear from which they are taken. Use care that the kernels do not get mixed with those from the ear next to it. After the kernels are removed, boards may be laid over the rows of ears to keep them in place until the result of the germination is known. Place the kernels from the ear of corn No. 1 in square No. 1 of the germination box; from ear No. 2 in square No. 2, and so on with all the ears. Lay a piece of good cloth on top of the kernels and dampen it by sprinkling water over it. Then place over this a cloth considerably larger than the box and fill in on top of this about two inches of moist sawdust and pack it down firmly by treading with the feet. The edges of the cover may be folded over the sawdust in the box to prevent drying out. The box is now ready to set away until the kernels sprout. Keep in an ordinarily warm place like the living-room where it will not freeze. The kernels will germinate in about eight days.

Remove the cover carefully to avoid misplacing the kernels in the squares. Examine the kernels in each square in the germination box, and discard all ears whose kernels in the box are dead or show weak germination.

Special Things to be Observed. Be sure to soak the sawdust at least one hour—or better still over night.

Use *good* quality of cloth (sheeting) for the cloth that is marked off in squa res and the cloth which is laid over the kernels.

Leave at least two inches margin around the edges of the box to prevent freezing and drying out.

Rule the cloth off in large squares 2½x2½ inches.

Never use the box the second time without first thoroughly scalding both the cloths and sawdust. (The cloth should be untacked and the sawdust removed to do this.)

Do not open too soon. The stem sprouts should be at least two inches long.

Throw out all ears showing weak germination as well as the dead ears.

Advantages of the Sawdust Germination Box. 1. It costs nothing but a little time and labor.

2. It furnishes nearly natural or normal conditions.

3. The sawdust is light, clean and easy to get and handle in February and the first of March, when the testing should be done; is a good non-conductor

of heat and cold, so that the temperature is kept even during germination, and holds the moisture so perfectly that there is no danger of drying out.

The number of boxes required will depend upon the amount of seed to be tested and the time limit. Where several boxes are used, we generally stack them up, one on top of the other.

When the first set of boxes has been taken off, it is a good plan to put another set over at once, and while the corn in these is sprouting, the first set of ears can be butted and tipped, shelled, graded and hand-picked. If more than one kernel of the six fail to grow, the ear should be discarded. If only one kernel fails to grow, the ear should generally be discarded; unless it is an especially good ear in other respects, when it might be well to give it another trial in the next test.

Ears whose kernels mold badly in the germination box should be discarded. If the kernels show weak, spindling sprouts, or a part of them are very weak and uneven, the ear should be thrown out to make place for an ear whose kernels give strong, vigorous sprouts. Remember that the kernels which are slow to sprout and are weak will be behind the strong ones in the field, and being shaded by them will give us weak, runty stalks with small ears.

Poor seed means a poor stand, with missing hills; one-stalk hills with weak stalks, producing little or nothing, also wasted land and wasted labor; it means less than thirty bushels of corn per acre instead of fifty or sixty; it means that we produce on an average in each hill just one small ear of corn weighing less than ten ounces.

The following illustrations will show thoroughly every step in making this test:

Fig. 24 Fig. 25

Fig. 24.—Putting the gunny sack of sawdust over to soak in warm water.

Fig. 25.—Pushing the sack of sawdust down into the water to insure thorough soaking.

Fig. 26.—Seed left to soak for at least one-half hour (better over night), when it should be removed from the water which has become cold and put into warm or hot water. It is always best to have the sawdust warm when put into the box, ready for the corn to be put over.

Sawdust can always be obtained from the ice house, sawmill, lumber yard or meat market.

Fig. 26

Fig. 27

Fig. 27.—Take the sack out of the tub and tread it to remove the excess of water, so that it will not be too cold and soggy for the corn and to prevent the water from running out of the box after the corn is placed therein.

Fig. 28

Fig. 29

Fig. 28.—Put two inches of this sawdust in the box and pack it down so that it is smooth and firm. It is now ready for the germination cloth. This box is 30x30x4 inches deep and will test 100 ears.

Fig. 29.—Place the germination cloth, which has been ruled off in squares, on the sawdust in the box and tack to the edges sufficiently to hold in place. Notice that there is a two and one-half inch margin around the edge of the box.

Fig. 30.—Ears laid out ready for making the germination test. A spike is driven after every tenth ear. Every tenth ear is numbered, as shown, with

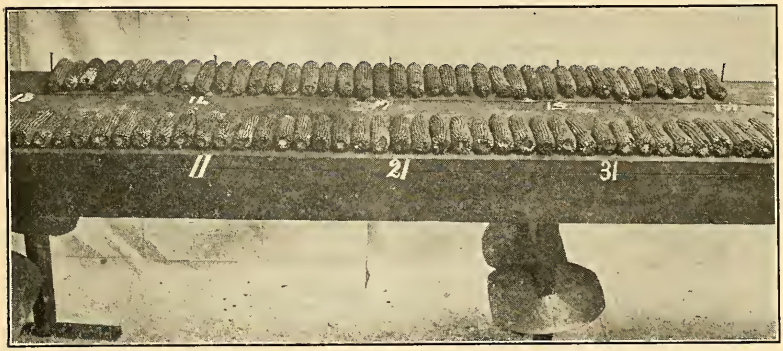


Fig. 30

a piece of chalk. Six kernels are now taken from different places in ear No. 1 and placed in square No. 1 on the cloth in the germination box, as shown in the next cut. This process is repeated with ears Nos. 2, 3, 4, etc., until all of the ears have been put over to test.

Fig. 31.—Arranging the kernels in the squares. The kernels are laid on their backs with germ side up, the tips toward the left and the crowns toward the right or top of the box. *Remember* that the crowns of the kernels are all *one way*, in this case toward the right.

Fig. 31

Fig. 32

Fig. 32.—Putting on the cover cloth. As soon as this is laid over the kernels, sprinkle a few handfuls of warm water over it to fit it down tight over them. It is now ready for the larger cloth, on top of which is to be put two inches of sawdust.

Fig. 33.—This cloth is larger than the box. On top of this fill in with about two inches of the warm sawdust and pack down firmly, as shown in next cut.

Fig. 33

Fig. 34

Fig. 34.—Packing the sawdust down firmly over the corn. The edges of this top cloth may now be folded in over the sawdust to prevent evaporation.

Fig. 35

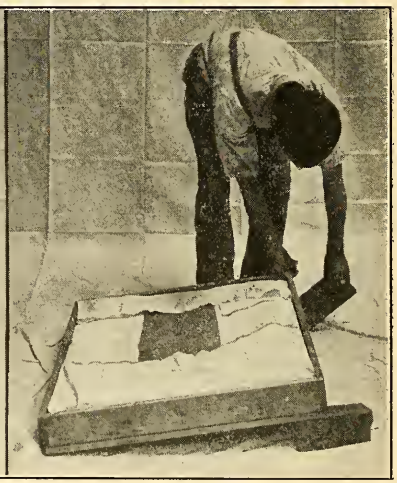


Fig. 36

Fig. 35.—Folding the cloth in from the edges over the sawdust.
Fig. 36.—The crowns of the kernels are toward the right side of the box

which is being raised by placing under it a four-inch brick. When the kernels sprout, the stems which come from the crown end of the kernels will grow toward the upper side of the box, and the roots which come from the tips of the kernels will grow down toward the lower side. The advantage of this will be apparent after you have had experience with testing.

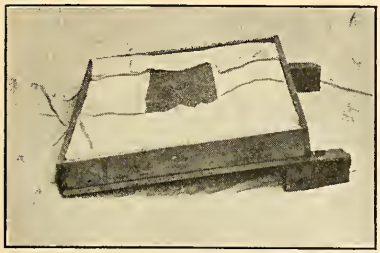


Fig. 37

Fig. 37.—Set away for the corn to sprout. Frequently five or six boxes will be put over at the same time and set on top of each other.

Fig. 38.—Rolling off the top cloth with the sawdust.

Fig. 38

Fig. 39

Fig. 39.—Peel back the cover cloth carefully so as not to disturb the kernels. The kernels have only started to sprout and the box must be recovered and left until the sprouts are two inches long, as shown in fig. 41.

Fig. 40

Fig. 40.—At the end of eight days the box is uncovered and carefully studied. The tester has pulled back ears Nos. 3, 8, 13, 18, 23, etc., and is now pulling back ear No. 17. This is to show that some or all of the kernels in the germination box from these ears were either dead or weak. These ears will be discarded.

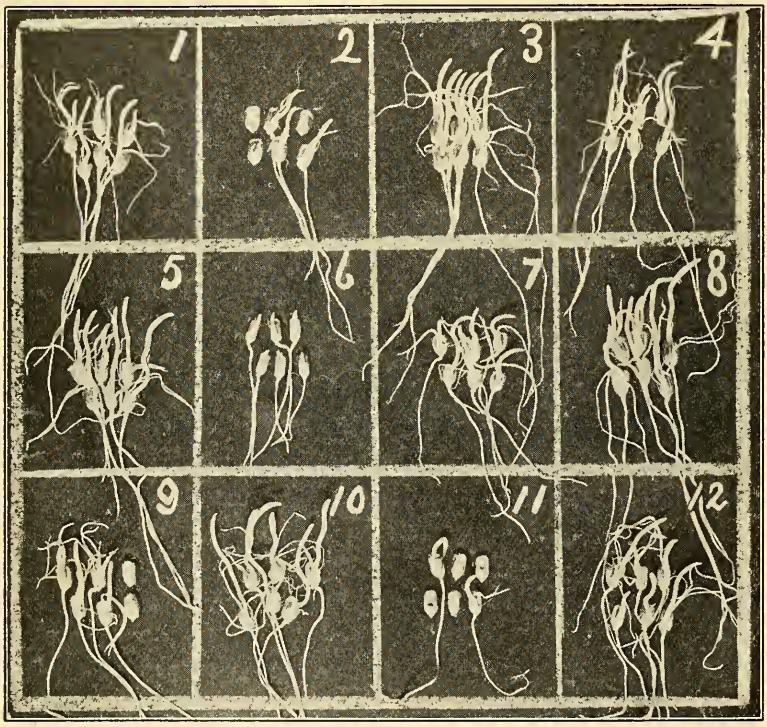


Fig. 41. Showing sprouts in the germinating test at the end of eight days.

Fig. 41.—Ears Nos. 2, 6, 9 and 11 should be discarded. Ears Nos. 3, 5, 8 and 10 are strong. *Save* out ears like these for the *best 100 ears* provided they are good in other respects. Ears may have life as in the case of No. 6, but when these kernels fall into the hills with others, like Nos. 3 or 5, they are deprived of food and light and give us stalks with little or no grain, but they produce pollen to scatter over the field to propagate their kind. Ear No. 6 is one of the kind that fools us, when we attempt to judge by the eye and the jack-knife method. Ear No. 6 was planted by the side of ear No. 3 but yielded less than half the corn in the fall.

If we buy the germination boxes and the cloth and hire the work done it will not cost to exceed sixteen cents per acre to test every ear for seed.

Fig. 42. Rows From Separate Ears.—Test each ear of seed before planting time and discard the dead ones. Don't GUESS but TEST.

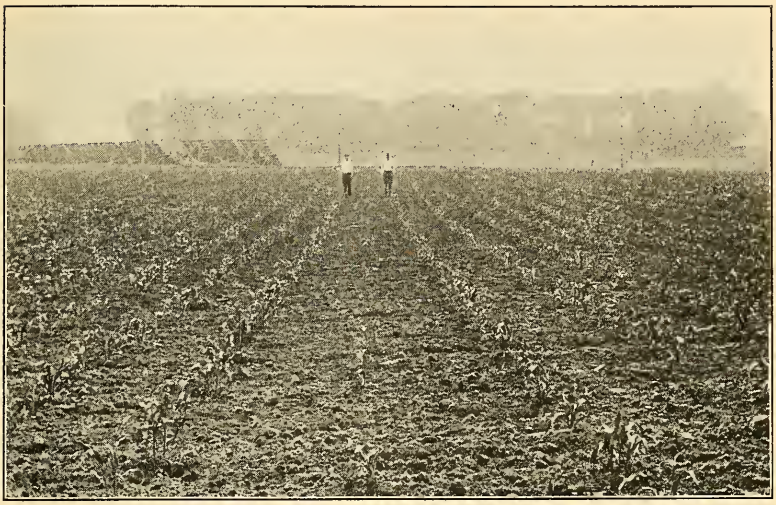


Fig. 42

Each row in this field was planted from a different ear of corn. The row on the left on which the man is standing is fine; the row on which the other man is standing is good; but the middle row, or the one between them, is almost worthless. The testers "GUESSED IT WOULD GROW."

THE THIRD ESSENTIAL

Shelling, Grading and Picking Over the Ears so That They Will Plant Properly

BUTTING AND TIPPING

Fig. 1.—When the corn has been tested and the weak and dead ears have been discarded, the small, irregular tip kernels and the large butt kernels should be shelled off, mainly because they will not drop evenly from the planter. In case there is more seed than can be tested at one time, it will be advisable to put a second set over to germinate while the first lot is being butted, tipped, shelled, etc.

SHELLING AND GRADING THE EARS

Fig. 2.—Shell each ear separately, catching the corn in a basin or box. This makes it possible to grade the corn as to size and quality of kernels. The young man at the right is examining the corn from an ear. If the kernels are large, he will put them in one of the boxes marked "large size." If clean, bright, and of good quality they will go into a box marked "first grade"; if not so good they will go into a box marked "second grade." If the kernels

are rather small they will go in a like manner into a box marked "small size." In case an ear when shelled shows a large number of broken, moldy or rotten kernels, or is inferior in quality in other ways, the corn is emptied into a

Fig. 1

dish marked "discard." Plant grade No. 1 first and use only what is necessary of the second grade to finish with. The larger planter plates should be used for the larger grade and the smaller plates for the smaller grade.

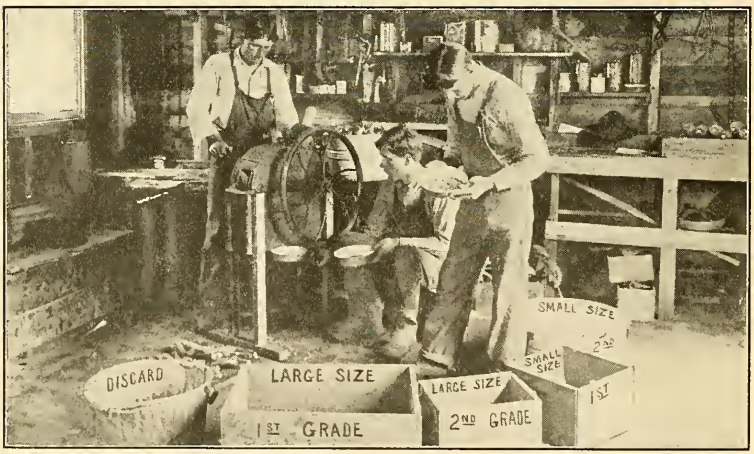


Fig. 2

The importance of shelling each ear separately cannot be too strongly emphasized.

TESTING THE PLANTER

After shelling fifteen or twenty ears and grading them as described in the former steps, the two grades should be taken to the planter and tested with the different plates. If the test shows that one or both of the grades are not suited to the plates, another fifteen or twenty ears should be shelled and the grades readjusted by putting more of the corn into the large grade, or the reverse. In like manner test these grades in the planter. You will now be in a position to shell the remainder of the seed and grade it intelligently. Testing the planter, as described, will require not to exceed two hours' work. The right amount of seed and an even drop are essential to the largest yield. This is especially true where the corn is mostly checked and the crop is grown for the ears and not for the fodder. DON'T GUESS, *know* that the planter drops your seed properly.

Fig. 3

Fig. 4

GETTING RID OF CHAFF AND IRREGULAR GRAINS

Fig. 3.—While not generally done, it is a good plan to put one-third to one-half of a bushel of shelled corn in a box at a time and tread it with the feet for two or three minutes to rub off the chaff and projecting tips of the kernels. Chaff gathers under the planter plates and around the trip and frequently greatly interferes with the dropping. There is often a little sharp projection at the tip of the kernels, especially if the seed was picked early or is slightly immature, which interferes with the regularity of the drop unless rubbed or broken off as described above. The corn should now be run through the fanning mill to blow out the chaff, or, better still, run through the little hand sorter as shown in fig. 4. This will not only take out the chaff but will also remove the small, inferior kernels and the large, irregular

ones, such as "nigger heads," which are caused by imperfect pollenization of the corn and are found more or less in every ear. Running the seed through the hand sorter greatly lessens the work of "hand-picking" described in the next step. A bushel of corn can be run through the hand sorter in five minutes.

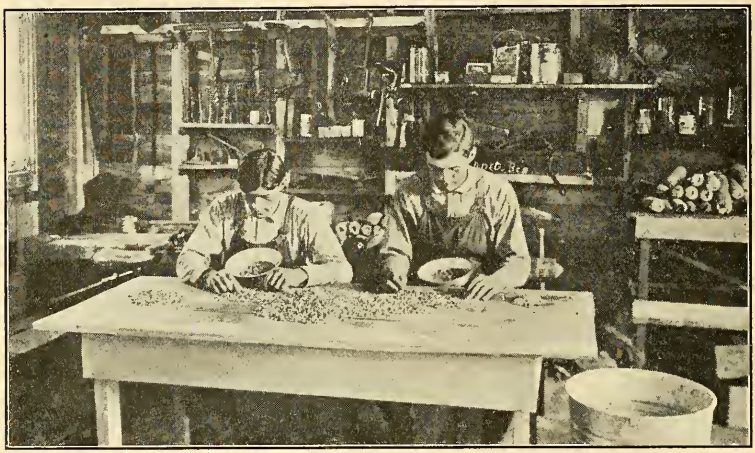


Fig. 5

PICKING OUT BAD KERNELS

Fig. 5.—Spread the corn on a table, a small quantity at a time, and pick out the black, broken, barren, moldy, rotten kernels which would take the place of good ones in the planter, leaving vacant places in the field where there should have been good stalks and good hills. This work is often done evenings when the boys and girls are home from school. The corn being spread out on the kitchen or dining-room table, it will require but an hour or so to go over a bushel of seed corn in this way, depending somewhat on the quality. If you have never run over your seed, hand-picking it as described above, you will have very little conception of the number of defective kernels you will find in a bushel. Try it this coming spring, you can't possibly lose. It will increase your profits this year and improve the corn for the future.

Fig. 6

STORING UNTIL USED

Fig. 6.—When the seed has been tested, graded for the planter, hand-picked, etc., as described, it should be put in sacks containing not more than one-half bushel each, and *hung* up in a *dry* place *free* from mice. There is probably no better place than in the attic, where the strings of seed corn were hung during the winter. (See fig. 7, p. 7.)

THE FOURTH ESSENTIAL

Planning to Obtain Next Year a Better Stock of Seed Corn, by Selecting it Only From This Year's Best

Special attention is called to the three sacks in the last figure hanging at the left labeled "*seed from the best 100 ears.*" This *best* seed was put in flour or sugar sacks to distinguish it from the general supply of seed which was put in grain or gunny sacks. At planting time, take down this *best* seed, put it in the planter and plant it on one side of the field. Finish the field from the general supply of seed. In the fall go into the seven or eight acres planted from this *best 100 ears* and gather the seed for next year's planting.

There is no law more certain than this that "like begets like." You ask how you are to secure those *best 100 ears?* While you are preparing the seed for the planter, i. e., sorting, testing, shelling, etc., keep watch for any unusually good ears. These should be laid to one side until all of the seed corn has been gone over. Then shell, hand-pick and hang up, in different-colored or different-sized sacks to distinguish them from the regular supply of corn seed.

Bear in Mind These Three Facts: First: That we cannot possibly lose and we are certain to increase our profits, not only this year but every year. Second: That it costs almost nothing except a little attention, thought and work at the right time. Third: That every one can do this work himself and at a time when no other farm work will be neglected.

PREPARING THE SOIL

Selection and Preparation of Soil

It will be understood by everyone that methods will vary greatly with different climates and different soils. There are no iron-clad rules which can be followed blindly in the growing of corn.

Frequently two very different methods may give similar results. However, there are certain principles which will apply under all conditions.

It should be the motto of every corn grower to have *good ground, to do* his work *on time* and to do it *thoroughly.*

Good Soil. What is needed is more clover, a better use of barnyard manure and a rotation of crops which shall include clover.

Nothing can make up for poor ground. Too many are trying to grow corn on worn-out land that has produced corn and oats for years. A man at an institute in Illinois said in all seriousness that he was satisfied that the seasons were less favorable for growing corn than they used to be, as he could get no such crops as he formerly raised. It developed that he had grown corn for seventeen years in succession on the same piece of ground. No wonder "the seasons were becoming less favorable."

The fact is that the time is near at hand when we must pay greater attention to the fertility of our soil, to the conserving and restoring of the elements of plant food, or we shall soon be compelled to pay out millions of dollars each year for these elements in the form of commercial fertilizers.

The tremendous importance attached to this question of plant food cannot be appreciated by those who have had no experience in using commercial fertilizers.

Fall Plowing for Corn. There is a great diversity of opinion regarding the merits of fall and spring plowing, even in the same neighborhood. Among the advantages of fall plowing may be named the following:

1. The work can be done at the dullest time of the year when both men and teams would otherwise be idle.

2. Having the ground already plowed in the spring gives us time better to prepare the soil, and, what is of equally great importance, to *get our corn in on time.*

3. Better preparation and a warmer seed bed insure a better stand of corn.

4. Fall plowing lessens the danger from insect injuries, especially in the case of sod ground.

5. Weeds are prevented from seeding, and the seeds already in the ground will mostly germinate and be killed by the fall freezes before seeding. This is especially true of early fall plowing.

Some of the disadvantages of fall plowing are:

1. Occasional losses from blowing and washing.

2. Unless the ground plowed in the fall is disced early in the spring there is loss of moisture and a consequent "firing" of the corn during the latter part of July and August, especially in dry seasons.

3. Fall plowing does not give as good an opportunity to spread manure during the late summer and through the winter.

Recently the Soils Department of the Iowa State College conducted experiments with fall and spring plowing in different parts of the state, and in every case the yield of corn was greater on the fall than on the spring plowed land. The evidence is generally in favor of fall plowing in the corn belt.

Fall Plowing Often Neglected. The mistake is commonly made of leaving the fall-plowed ground without discing until time to plant. By spring the ground has become packed by snows and rains and should be disced or at least harrowed as soon as oat seeding is over. This will conserve the moisture and prevent the "firing" of the corn in August, that so often follows fall plowing.

Ground that is very rolling and likely to wash should not be plowed in the fall. Early fall plowing is generally advisable where the stubble ground is very weedy.

Where the area put into corn is large, and the corn planting period is short, it is best kind of management to fall plow all stubble and sod ground.

It may sometimes be advisable to leave some ground for spreading manure on during the winter. In this case it had better be the clover sod than timothy or bluegrass.

Where clover is seeded with the oats or barley for fertilizing purposes, or where rape is sown in the oats for fall feed, it will, of course, be necessary to plow late in the fall.

Early Spring Discing. The fall-plowed ground is generally neglected in the spring and left to dry out, while the weeds get a good start, robbing the ground of moisture and food. Not only should the fall-plowed ground be disced as soon as the oat seeding is over, but the corn-stalk ground as well. When corn-stalk ground is disced early in the spring, the moisture is saved, the stubs and stalks are cut up and mixed with the soil, and as a consequence are less bother during the cultivation, and a better seed bed is secured. If not disced, the surface is turned to the bottom of the furrow in a lumpy condition, where neither the harrow, disc nor cultivator can reach it.

Better Treatment of Spring Plowing. We often abuse our spring-plowed land by turning up the furrows to the sun and dry winds to bake and dry out, depending on a shower to mellow the ground at planting time. It is a good rule never to leave the field either at noon or at night without first harrowing the ground that has been plowed.

There is seldom any advantage in plowing more than six inches deep either in spring or fall. If ground is to be plowed deeper than formerly it should be done in the fall. On heavy soils the bad effects of too deep plowing is often apparent for several years.

PLANTING THE CORN

Time and Method of Seeding—Quantity of Seed

Early Planting. While too early planting is not advisable, yet I am perfectly safe in saying that for every dollar lost by too early planting, there are twenty dollars lost from planting too late.

The advantages of reasonably early planting are: The assurance of better yields, better quality, and a better condition of ground; while there is less risk from frost in the fall, less danger of the freezing of seed before it is dried out and from spoiling in crib. Also there is time to replant in case of a poor stand due to any cause such as poor seed, too deep planting, injury from insects, etc.

Hills Better Than Drills. Generally, it is best to plant in hills. Repeated experiments show that there is no difference in yield of grain between the two methods of planting where the same amount of seed is used and the corn is kept equally clean; but it is more difficult to keep the drilled corn free from weeds under the average conditions and as a consequence the yield is more or less reduced. If there is any advantage from distributing the stalks in the case of drills, it is more than balanced by the better cultivation which the ground receives when the corn is planted in hills.

Corn may sometimes be drilled to advantage under the following conditions: When the field is narrow or irregular or full of obstacles, such as stumps; when fodder is the prime consideration; when the ground is sod and comparatively free from weeds, but badly infected with cutworms and other insects; or when listing is practiced.

Quantity of Seed to Plant. The number of kernels it is best to plant in each hill will depend on the strength or richness of the ground; type of corn—whether it is large or small; distance apart of rows and hills; latitude; the purpose for which the crop is grown; rainfall; and the vitality or germinating power of the seed.

Corn should be planted thicker on strong land than on thin ground. Thick planting on poor land results in a large amount of fodder or stover at the expense of grain. On the other hand, it is even a more serious mistake to plant too little seed on very rich ground for the plants will sucker badly, and give a large amount of fodder but a disappointing yield of corn. The small, early growing varieties should be planted thicker than the large, late growing kinds. In northern parts where smaller varieties are grown, more seed should be used than farther south. For example, it is customary to plant three and four kernels per hill (generally four), in Michigan, Wisconsin, Minnesota and South Dakota, while two and three are planted in Tennessee, Missouri and Kansas. Still farther south corn is planted in drills four feet apart and it is thinned down to one stalk every two or two and one-half feet in the drill. This would not be half the number of stalks required to give the best results in Iowa or the north two-thirds of Illinois. Experience shows that corn should be planted thinner where the average annual rainfall is light.

Corn is generally planted to-day in hills three and one-half feet apart each way. In some sections three feet eight inches is still the rule, but the tendency is toward three feet six inches as the standard. It is not settled that this is actually the best distance from the standpoint of yield, but taking the average of conditions it is probably not far from right.

There is a tendency on the part of the manufacturers of planters, check row wires and cultivators to adopt a standard which is largely determined by the demand, but when once established the disposition to change is slow.

Taking these standard distances of three feet six inches and three feet eight inches apart each way, what are the actual results year after year on different soils and in different localities, from planting different numbers of kernels per hill?

After making a careful study of this question for the past ten years, I believe I am safe in making the following statement: That there is much greater danger from a stand too thin than from one too thick.

Corn never thickens up. There is always a process of thinning out from the day it is planted until it is ripe. If we plant three and one-half kernels per hill, that is, three in one hill and four in the next, we will have at harvest an average of two and one-half stalks per hill. If we plant four we will come through with two and three-quarter stalks per hill. We make the mistake of thinking that if we plant three kernels we are getting three stalks per hill.

Many Plant Too Deep. Too deep planting is especially bad when the seed is weak, and the spring cold and backward. When the ground is not well prepared, or is very mellow, there is danger of putting the seed down four or five inches, when two inches would be better. Especial care should be taken in early planting when the ground is still cold.

Where the same seed was planted in two different fields, giving a good stand in one case and a very poor stand in the other, investigation showed that the poor stand was due to deep planting. Corn is generally planted deeper than we think. The planter wheels frequently sink into the ground two or more inches and the corn is covered another two inches. The planter tracks are then filled by harrowing, and the corn is often more than four inches deep. We usually watch the depth carefully for a few rounds when we start the planter and then pay no more attention to it. The soil is generally mellower as we get away from the head land, and consequently the corn is planted deeper than we supposed. The following illustrations show the results of deep and shallow planting:

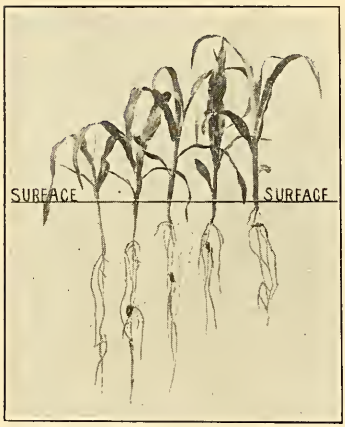


Fig. 1

Fig. 2

Fig. 1. Kernels Planted One, Two, Four, Six and Eight Inches Deep.—Not only do many kernels fail to grow when planted too deep, but those that come up are weaker, often producing no ears.

Fig. 2. Effect of Deep and Shallow Planting. (*a*) planted two inches deep; (*b*) planted six inches deep.—Many are careless in planting and get the seed too deep. This is especially bad when the ground is cold and wet. Even when the ground is warm, the results are not so good as when the seed is put two to two and one-half inches deep. Twenty kernels of strong seed were planted on warm, sandy soil June 30th. Ten of the kernels were planted two inches deep (*a*) and ten were planted six inches deep (*b*). All ten kernels of the two-inch planting came up quickly and gave strong plants, as shown in the illustration. Only four of the ten kernels planted six inches deep came up and they were several days later appearing. The other six kernels sprouted but could not push their way to the surface, the sprouts doubling back as shown at (*c*).

Straight Rows and Even Checking. The yield of corn is often reduced and the work of cultivation made difficult and slow, because of carelessness in handling the planter. Uneven checking may be due to several causes. In the case of short fields we generally draw the wire too tight and the planter checks too quick both ways. On long fields we are apt to check ahead owing to the slack in the wire, and this is especially true where the tongue of the planter is raised too high and the team is fast.

In the case of irregular shaped fields, the checking is frequently bad. This is especially true where the ends of the field are not at right angles with the rows. In this case there will be a jog every four rows, depending on how much the field is out of square.

Carelessness in setting the anchor is the cause of much poor checking. It is a common practice to draw the wire to about a certain tightness at both ends of the field. It is a much better plan always to draw the anchor back at one end of the field to a definite line indicated by stakes, while at the other end it should simply be drawn until the wire has a certain tightness.

CULTIVATION

Maintaining a Good Seed Bed and Conserving Moisture

Keeping Ground in Good Condition. Many think that there is nothing to do for two weeks after the corn is planted or until it is up and large enough for the first cultivation. There are others who believe in harrowing, and even in cultivation before the corn is up, but on account of the pressure of work neglect it. Where ground is left untouched for two weeks and often longer, it becomes fouled with weeds, which take up moisture and plant food and make it difficult to work the corn. The ground is packed by the rains and baked by the sun, until it becomes hard and dry, and out of condition.

It is especially important in the growing of corn that it be not stunted when young, as it never fully recovers even under the most favorable conditions.

We should keep a good, mellow, lively tilth until the corn shades the ground, and prevents the rain and sun from beating upon it, and making it hard and dry.

The time to kill weeds is before they come up and before they have deprived the corn of moisture and nourishment.

Blind Cultivation. Where it is possible to do so it is a good plan to cultivate the corn once before it comes up, following the marks made by the planter wheels. This is known as "blind cultivation." The cultivator shovels should be set so as to throw the dirt slightly away from the row. It is generally best to follow with the harrow in the same direction within two or three days. If the field is small so that the cultivation can be finished before the corn breaks through the surface, it is well enough to wait until the field is all cultivated, and then cross it with the harrow instead of following close behind the cultivator. However, in the case of large fields, it is best to follow the cultivator with the harrow.

It is a common practice with some to harrow corn after it is up, but I prefer to cultivate and harrow as described above, and especially on corn-stalk ground where the old stubs catch more or less in the teeth. Even on oat stubble ground the harrow does considerable damage to the young corn. No one can afford to do less than to thoroughly loosen the ground before the corn comes up. It is a serious mistake to let our corn ground once get out of condition in the spring.

Shallow Cultivation at "Laying by" Time. It is also a very common mistake to cultivate shallow when the corn is small and lay it by with a deep cultivation. The reverse would be more profitable. There is little danger to the roots from the first deep cultivation, and there is a great advantage in going deep enough to secure a good mulch.

The succeeding cultivations should be no deeper than is necessary to keep the ground clean. "Many cultivate corn as though the roots went straight

down" instead of spreading out through the surface of the soil. It is very essential that we disturb the roots as little as possible when the corn is "laid by." We are very apt to feel that as this is our last chance at the corn, we must give it a deep cultivation, especially if the weeds have gotten a start. This is a mistake. Cultivation should be level and frequent. It may be deep at first but must be shallow later.

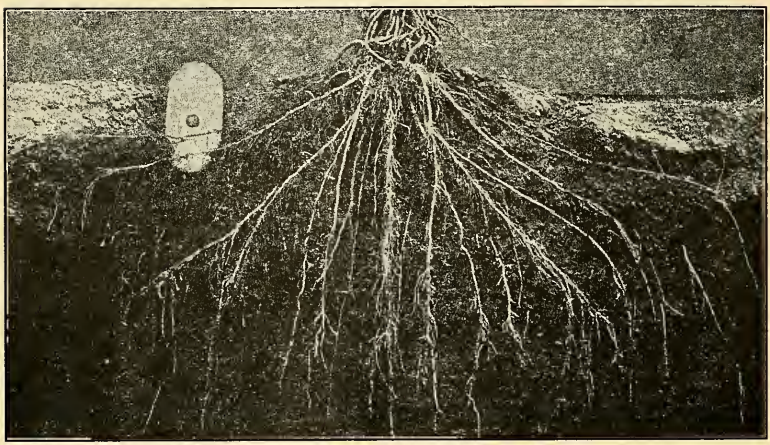


Fig. 1

Fig. 1.—"Many cultivate corn as though the roots went straight down."
Fig. 2.—Four hills of corn at earing time, in natural position in the field, three feet eight inches apart. The surface soil was washed off as deep as the

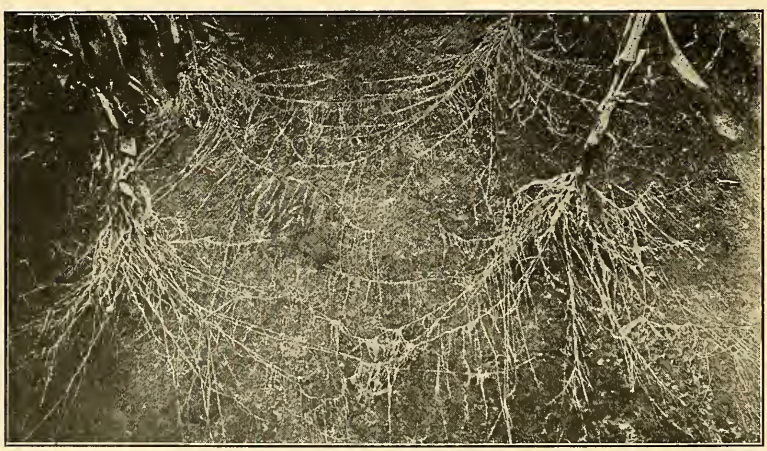


Fig. 2

ground was plowed in the spring, exposing the roots. Few realize how completely the ground is filled with the corn roots. Thorough early cultivation before the roots have developed is important. Experiments show that deep

cultivation at the time of "laying by" greatly reduces the yield, especially when the first and second cultivations were shallow, thus allowing the roots to come near the surface. (Photograph by Prof. A. D. Showel.)

WINNING PRIZES

Points to be Considered in Corn Contests

The best ear of corn is that ear which will, when planted, give the greatest profits per acre year after year. The *best ear* of corn for **seed** is also the *best ear* for the **show.** The judge will place the blue ribbon on that ear or on that sample of corn which he would select to plant year after year on his own farm, if he lived in the district from which the exhibits are made.

In picking out his samples for the show the exhibitor should lay his ears out side by side on tables or planks where he can study and compare them.

Four Questions. There are four fundamental questions which the exhibitor must ask himself in selecting his corn for the show or for seed. These are the four questions which the judge will also ask himself in placing the corn:

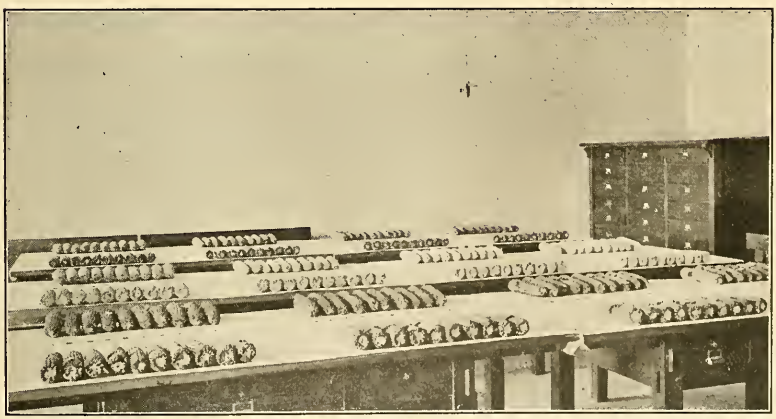
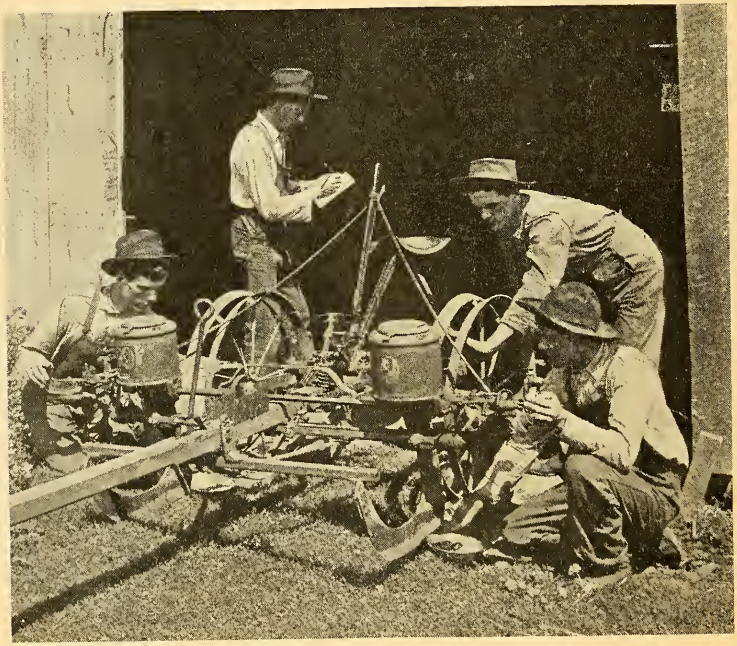
1. Will it yield, will it produce, has it constitution, vigor, hardiness? Among the things which go to indicate good yield are size, shape, solidity and weight of ear, depth of kernel, size of germ, fullness of tip, of kernel, etc.

2. Will it mature; i. e., ripen, not only this year, but every year in the region or district in which it is grown or entered for show? Immaturity will be indicated by too large an ear, too deep a kernel, sappiness, chaffiness, dull, starchy appearance, etc.

3. Will it grow; i. e., will it germinate, giving strong, vigorous plants which will stand unfavorable conditions in the spring and summer?

The exhibitor can settle the third question as to whether or not it will germinate strongly, by testing six or eight kernels from each ear in advance of the show.

4. Does it show improvement? Has it years of careful selection or breeding back of it? Has it been mixed with brains so that it will reproduce uniformly in type, in time of maturity, in size and shape of both ears and kernels?



LIBRARY OF CONGRESS
0 002 682 408 4